Curriculum and Teaching Methodology (2023)
Clausius Scientific Press, Canada

DOI: 10.23977/curtm.2023.062004
ISSN 2616-2261 Vol. 6 Num. 20

Exploration on Classroom Teaching Quality of Intelligent Digital Information and Cloud Model

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Keywords: Intelligent Digital Information, Cloud Models, Classroom Teaching, Teaching Quality

Abstract: In the era of information explosion, digital technology has penetrated into every aspect of people's lives. Intelligent digital information and cloud models, as emerging educational technologies, provide new possibilities for improving the quality of classroom teaching. The quality of classroom teaching is influenced by various factors. Among them, teachers' teaching methods, relevant information skills mastered, and school facilities and equipment can all have an impact on the quality of teaching. This article conducted in-depth research on the quality of classroom teaching and applied relevant methods of digital information and cloud models, enabling a deeper understanding of the detection and calculation of classroom teaching quality. This article mainly applied the survey method and AHP (Analytic Hierarchy Process) to analyze the factors that affect the quality of teaching and calculate the consistency of the factors. The data results showed that there was a significant difference between the consistency and random consistency values of teaching effectiveness, which were 0.0046 and 0.0079, respectively.

1. Introduction

With the development of the information age, cloud technology is also constantly advancing, and various application software on cloud platforms are emerging endlessly. This includes digital information, data storage and transmission systems, multimedia classroom management, and teaching resource analysis, which have been used in the field of education. Digital information and cloud modeling technology are gradually being applied to classroom teaching. It is a new digital teaching mode based on a network architecture platform and the Internet environment.

The development of information and data technology has made it easier for people to access and process massive resources in their daily lives. The cloud model is a virtualization, high scalability, and effective support for multi-platform collaborative work systems. Shrikant D proposed a new cloud data security method that involves two different processes: cleaning and restoring recommended data. By hiding users and unnecessary access, data cleaners can protect sensitive data stored in large databases. In this case, improved early methods can be used to clean up the data [1]. Geehu Mary George stated that cloud development has played an important role in initiating secure communication between users. However, data protection and large-scale database management are a major issue in cloud models. Due to a lack of trust among stakeholders, this can affect data exchange. That's why they provide a new blockchain authentication and access control technology that can reliably verify data integrity between cloud owners and requesters without relying on end users [2]. I. Mettildha Mary pointed out that cloud computing networks are distributed and dynamically change as signals appear/disappear or their meaning is lost. Compared to the samples used for inferring information, the dataset for machine learning training is sometimes insufficient. The use of dynamic strategies in automatic selection and adjustment of machine learning development processes can lead to significant performance differences. However, this scheme has many drawbacks, especially the driving continuity, which requires more sampling and driving time when selecting features, as well as increased classification execution time [3]. Based on the teaching model of cloud computing, this article focused on the problems that arise during the interaction between intelligent digital information and educational resources. This article improved the information and cloud model in teaching and proposed methods to improve the quality of classroom teaching.

This article believed that intelligent digital information can play a role in multiple fields, so its application in classroom teaching was analyzed. After that, the relevant technologies, characteristics, and applications of cloud models in improving teaching quality were elaborated. Afterwards, a comparative analysis was conducted on intelligent digital information and cloud models. Finally, digital information and cloud models were described through classroom teaching quality evaluation, and relevant teaching quality effectiveness data and results were obtained.

2. Intelligent Digital Information and Cloud Models

2.1 Intelligent Digital Information

Intelligent digital information refers to data and information processed through digital technology and containing intelligent characteristics [4-5]. It can provide richer, more accurate, and useful information through collection, analysis, processing, mining, and other methods. It plays an important role in the digital economy and is a core element driving digital transformation, playing a crucial role in decision-making, innovation, and competitiveness enhancement for enterprises and organizations. Intelligent digital information has the characteristics of high-speed, diversity, massive, and real-time. It can be presented in various forms (text, images, videos, sensor data, etc.) and applied in multiple fields (finance, healthcare, transportation, education, etc.).

Intelligent digital information, such as multimedia teaching resources, online courses, and interactive platforms, provides rich and diverse materials for classroom teaching. These resources not only attract students' attention and enhance their interest in learning, but also help them better understand and master knowledge. In addition, intelligent digital information can also collect and analyze students' learning data in real-time, and provide personalized teaching plans and feedback to teachers, thereby improving teaching quality [6].

2.2 Cloud Model

The cloud model is a distributed computing and storage model built on a cloud computing platform [7-8]. It utilizes cloud computing technology to centrally manage and schedule resources such as computing, storage, and services, providing a flexible, scalable, and cost-effective computing environment. It is a virtualized model based on network and computing resources. Cloud models mainly focus on digital information, including storage systems and data processing [9-10]. Based on digital information, model a complex problem and provide a visualization tool and method. It can abstract data, algorithms, etc. into rules or textual forms. Based on the Internet, teaching objectives are achieved by integrating, sharing, and analyzing information resources. It provides powerful computing and storage capabilities for businesses and individuals, supporting the processing, analysis, and application of intelligent digital information. Cloud models have characteristics such as virtualization, elastic expansion, shared resources, and flexible payment. It can dynamically adjust resources based on actual needs, providing high reliability and availability computing and storage services.

Based on the three-layer service model of cloud computing and the core architecture of mobile learning, the core model of university mobile learning cloud education platform is divided into three layers [11-12]. Infrastructure as a Service can integrate physical resources through virtualization technology and provide users with virtual hosting and storage services, helping teachers and students simplify the development and deployment process, and creating a more suitable network environment for storing learning resources. The platform as a service layer provides data exchange and authentication services from the data layer to the service layer, mainly providing data exchange, supporting wireless applications, text message services provided by learners' mobile devices, and single sign on systems. The software as a service layer mainly provides mobile portals and learning platforms. The cloud education platform is an open learning platform that provides resources, communication, and application services for learners. Among them, learning resource services are the most important, and cloud education platforms have rich educational information resources.

The cloud model provides a convenient online learning and teaching environment for students and teachers by virtualizing computing resources and services [13-14]. Cloud platforms can store and manage a large amount of intelligent digital information, achieving resource sharing and reuse. Teachers can prepare, teach, and provide guidance on the cloud platform, while students can learn, interact, and provide feedback independently on the cloud platform. Cloud models can also provide precise educational decision-making support for educators through big data analysis and artificial intelligence technology, further improving teaching quality [15].

2.3 Comparative Evaluation

Intelligent digital information is a collection of data and information that is collected, processed, and analyzed in different ways. The cloud model is a computing and storage model built on a cloud computing platform, providing centralized management of computing and storage resources. The main function of intelligent digital information is to provide richer, more accurate, and useful information to support decision-making and innovation. The function of cloud models is to provide powerful computing and storage capabilities, supporting large-scale data processing and service provision. Cloud models provide infrastructure and support for the processing and analysis of intelligent digital information, enabling it to perform calculations and storage more efficiently. Intelligent digital information is stored, processed, and shared through cloud models, achieving larger scale and more efficient applications.

The application of intelligent digital information and cloud models can help improve the interactivity and effectiveness of classroom teaching. They provide students with a richer and more diverse learning experience, stimulating their enthusiasm for learning and innovative spirit. At the same time, these technologies also help solve the problems of geographical, time, and resource limitations in traditional classroom teaching, allowing more students to enjoy high-quality educational resources [16-17].

3. Evaluation of Classroom Teaching Quality

3.1 Evaluation Principles and Methods

The diversity of classroom teaching quality evaluation can evaluate the diversity of personnel. As a constantly changing individual, students' development needs are diverse. People not only need to evaluate teaching outcomes, but also consider evaluating teaching concepts, teaching methods, and teacher attitudes. The development principles for evaluating the quality of classroom teaching focus on teacher development and student progress. The main purpose of evaluation is to improve the quality of classroom teaching and enable learners to fully develop. During the evaluation process, evaluators must adhere to professional ethics. It is necessary to strictly implement all aspects of the evaluation work and ensure that the results obtained are true. The evaluation system must help reflect and guide students, thereby playing a leadership role for them and fully utilizing their initiative. The quality of teaching work not only includes the teaching ability of teachers, but also includes aspects such as educational attitude and teaching quality [18-19].

The main characteristic of AHP is the combination of qualitative analysis and quantitative analysis. When evaluating classroom quality, the backpropagation neural network receives each indicator value and standardizes it based on the classroom quality score indicator system. It determines the number of neurons based on the number of evaluation indicators, and defines motivation functions and learning parameters based on the evaluation indicator system to obtain a teaching quality evaluation model [20]. The actual evaluation value of the neural network is compared with the error of the initial value, and simulation experiments are conducted to obtain the evaluation results.

3.2 Cluster Analysis Technology

Cluster analysis usually refers to the process of decomposing a dataset with a large number of data objects into many clusters. The cost function of the K-Means algorithm is:

$$K(l,v) = \sum_{i=1}^{m} \left\| A^{(i)} - v_{l^{(i)}} \right\|^2 \tag{1}$$

Among them, l is the number of clusters. The evaluation of classroom teaching quality in universities mainly focuses on teachers and students. Under the premise of quality education, the indicators for evaluating learning effectiveness include regular grades and final grades. The comprehensive evaluation indicators for learning effectiveness are shown in Table 1.

Table 1: Comprehensive evaluation index of learning effect

Comprehensive results	Indicator items	Percentage
Usual performance	Attendance rate	5
	Classroom performance	20
	Assignment completed	15
Final grade	Exam score	60

Among them, the average score accounts for 40%, and the final score accounts for 60%. Usually, regular grades mainly refer to teachers' rough evaluation of students' performance based on their attendance rate, active participation in classroom interaction, and adherence to classroom discipline. The final score is the final score on the paper. The K-Means algorithm in clustering analysis enables people to analyze students' various exam results and determine how they learn in specific courses. Based on the characteristics of this course and the students themselves, a rational and scientific evaluation of the effectiveness of students' learning can be conducted.

3.3 Construction of Evaluation Model

Using rough set theory, this article constructed a knowledge system based on the collected data. The importance of attributes was calculated based on their dependencies and the weight of rating indicators was determined. The backpropagation neural network adjusts the connection weights between the hidden layer and the output layer to reduce the error between the output and the expected output until the error meets the requirements. To facilitate the processing of coarse width, the same width method was used to discretize the original data. In order to further simplify, the application of attribute reduction principle vertically simplified the decision attributes in the decision table and eliminates unnecessary attributes. Among the indicators that reduce conditional attributes, this article used six indicators, namely language teaching, answering questions, organizing discussions, expanding materials, in class quizzes, video playback function, etc. (represented by 1-6). In order to verify the accuracy of new sample evaluation in the rough set neural network quality evaluation model of online learning platforms, this article selected three online learning platforms distinguished by style (content, interaction, and compatibility) for testing. The core metrics scores of three types of online teaching platforms were analyzed.

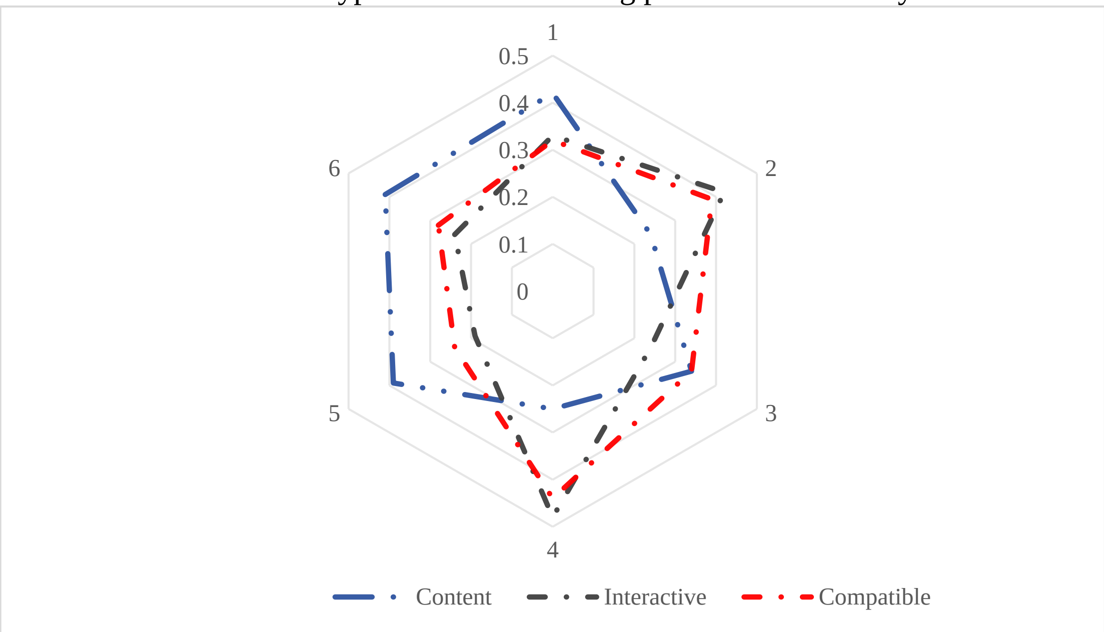

Figure 1: Core index score of the three types of online teaching platforms

In Figure 1, the index scores of content based online teaching platforms in language teaching, answering questions, organizing discussions, expanding materials, in class quizzes, and video playback functions were 0.42, 0.24, 0.34, 0.25, 0.39, and 0.41, respectively. The functional scores of interactive online teaching platforms from 1 to 6 were 0.33, 0.42, 0.24, 0.48, 0.19, and 0.24, respectively. Based on compatible online teaching platforms, the value of expanding materials is the highest.

3.4 Teaching Quality

In the experiment, 50 samples were collected and K-Means clustering algorithm was used to conduct experimental research on data containing five attributes (referring to "ability", "method", "content", "attitude", and "effect") in each of these samples.

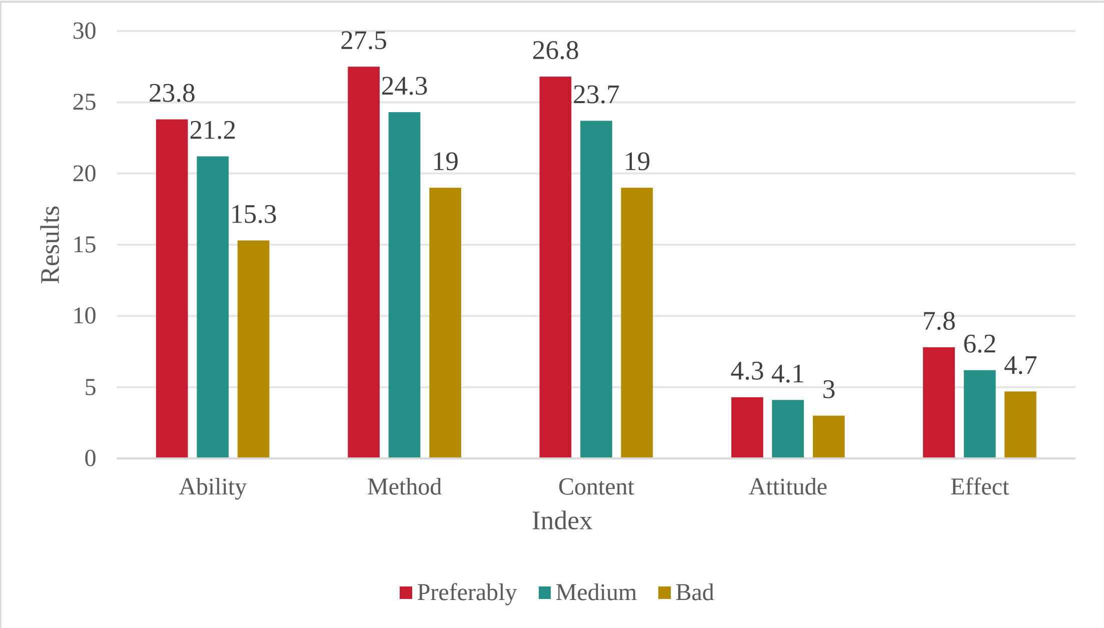

Figure 2: Results of the clustering

In Figure 2, the proportion of individuals with good abilities was 23.8%; the proportion of individuals with moderate abilities was 21.2%, and the proportion of individuals with poor abilities was 15.3%. The proportion of good methods was 27.5%; the proportion of moderate methods was 24.3%, and the proportion of poor methods was 19%. The overall performance was good. 26.8% had good content; 23.7% had moderate content, and 19% had poor content. The proportion of attitudes and effects was relatively small, with good rates of 4.3% and 7.8%, moderate rates of 4.1% and 6.2%, and poor rates of 3% and 4.7%, respectively.

By analyzing the indicator system, a hierarchical model composed of target layer, standard layer, and indicator layer can be created. The comparative evaluation matrix shows the relative importance of various factors related to the previous level of factors. Layered single sorting is the calculation of the maximum eigenvalue of each judgment matrix and its corresponding eigenvector to obtain a layered single sorting. Consistency check is to verify the matrix CI:

$$CI = \frac{\varepsilon_{\max} - m}{m - 1} \tag{2}$$

To test whether the matrix has satisfactory consistency, it is also necessary to compare CI with the average random consistency index RI. In order to evaluate the overall ranking of hierarchy, the following methods can be used:

$$CI = \sum_{i=1}^{m} \mathrm{x}_i CI_i \tag{3}$$

Among them, CI_i is the consistency indicator corresponding to x_i.

$$RI = \sum_{i=1}^{m} \mathrm{x}_i RI_i \tag{4}$$

Among them, RI_i is the average random consistency indicator corresponding to x_i.

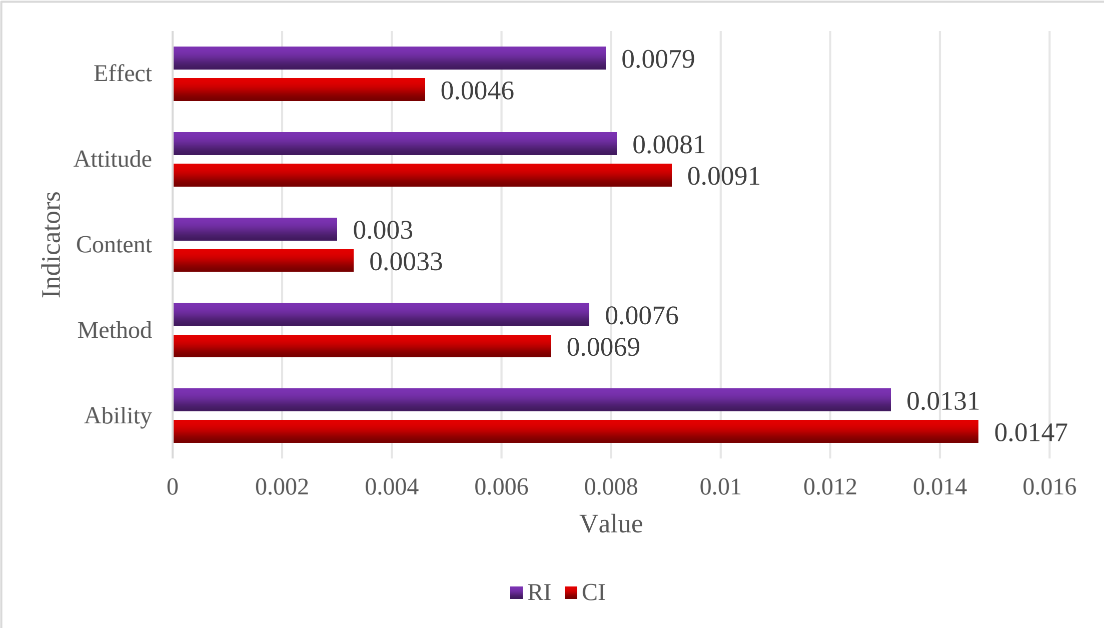

Figure 3: Results of the consistency single ranking test

The results of the consistency single ranking test are shown in Figure 3. The consistency in teaching ability was 0.0147, and the random consistency value was 0.0131. The consistency in teaching methods was 0.0069, and the random consistency value was 0.0076. The consistency in teaching content was 0.0033, with a random consistency value of 0.003. The consistency in teaching attitude was 0.0091, and the random consistency value was 0.0081.

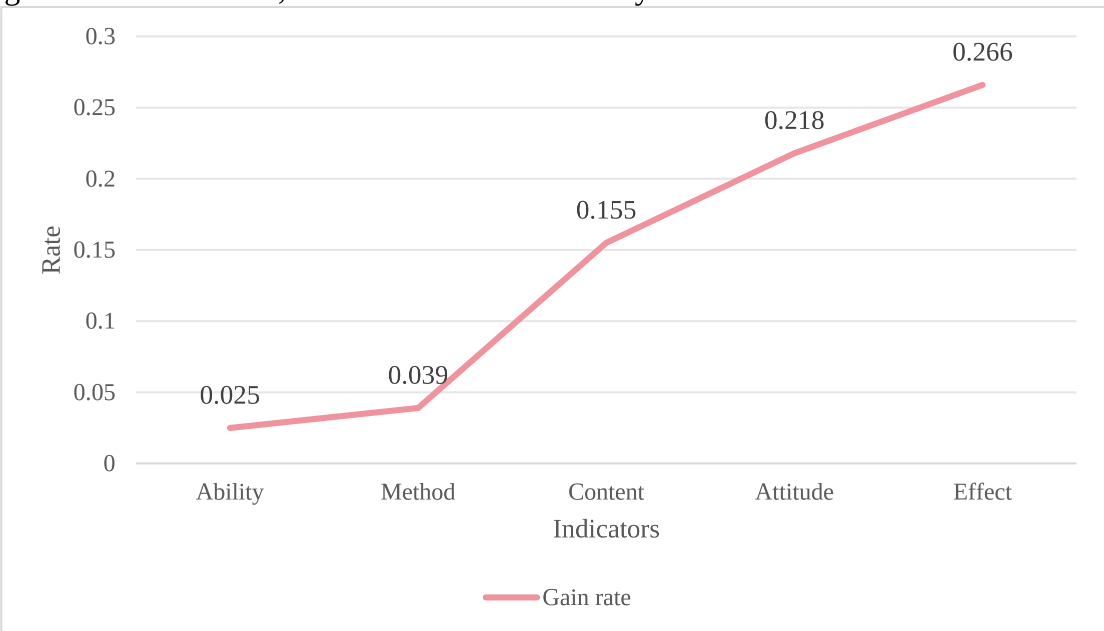

Figure 4: Information gain rate of teaching quality index

In Figure 4, the information gain rate based on teaching ability was the lowest, only 0.025, and the information gain rate based on teaching methods was 0.039. The information gain rate based on teaching content increased significantly, reaching 0.155. The information gain rate based on teaching attitude was 0.218, and the value of teaching effectiveness was 0.266.

4. Strategies for Improving Teaching Quality

Teaching quality refers to the level of understanding and mastery of knowledge by teachers and students during the education process. In class, teachers should lead by example and use their superb language to teach. Teachers are not just imparting knowledge to students for learning. At the same time, they should also experience a happy and relaxed atmosphere in which to grow and develop their own abilities and qualities. Only by improving the quality of teaching can the emotional exchange between teachers and students be promoted and achieve good interaction. The quality of teaching is an important factor that affects students' learning, and teachers attach great importance to every aspect in the classroom. The majority of students' learning in the classroom is explained by teachers after class. Teachers should promptly supplement and improve the important information and knowledge points involved in each lesson. At the same time, online platforms can also be used to provide teachers and students with an opportunity for communication and exchange. Digital information and cloud models have also been widely applied and promoted, providing students with a platform for independent learning and free exploration. In the classroom, the pre class preview session can be used to review the learned courses. By watching videos assigned by teachers online, students can improve their mastery of knowledge points. The intelligent information management of students is mainly achieved through the joint efforts of teachers and school managers. Therefore, to improve their information technology capabilities, universities need to pay attention to updating and maintaining resources such as computer application software and network platforms in daily teaching.

In classroom teaching, the teaching of teachers and the learning of students are interrelated and complementary. On the one hand, teachers should attach importance to in-depth analysis and refinement of course content. On the other hand, attention should also be paid to cultivating innovative awareness. To strengthen the construction of teacher-student interaction and exchange mechanisms, information exchange and sharing between teachers and students can be achieved through various methods such as multimedia courseware and network platforms. By improving the efficiency of teacher questioning and the quality of problem feedback in the classroom, it can promote better teaching effectiveness and more efficient learning motivation for students.

5. Conclusions

In today's intelligent era, digital information is the key basis for handling various problems. People can keep up with the trend of the times and use digital information technology to update and upgrade classroom teaching activities. With the development of digital information and cloud models, both teachers and students can make online attempts in teaching. This article started with the principles of digital cloud information and intelligent cloud models, and analyzed how to construct an online teaching quality evaluation index system based on artificial intelligence neural network technology and fuzzy logic inference algorithm. The application of intelligent digital information and cloud models in classroom teaching provides educators with new teaching tools and strategies. They not only enrich teaching content and enhance students' interest in learning, but also collect and analyze students' learning data in real-time, providing personalized teaching support for teachers. Educators need to constantly learn new skills and master new tools to adapt to the trend of digital education. At the same time, they also need to pay attention to the comprehensive development of students, ensuring that the use of intelligent digital information and cloud models does not replace traditional teaching methods and values.

Acknowledgement

This work was supported by Zhejiang province higher education "The 14th five-year plan" teaching reform research project:" AI+ Interdisciplinary+Personalization "Research on the training mode of applied innovative talents in digital media specialty, No: jg20220620.

References

[1] Shrikant D., Dhamdhere M., Sivakkumar V. Modified Apriori Based Data Sanitization for Cloud Data Security: An Optimization Assisted Model. Cybern. Syst. 54(8): 1348-1374 (2023)

[2] Geethu M., George L. S. Ethereum Blockchain-Based Authentication Approach for Data Sharing in Cloud Storage Model. Cybern. Syst. 54(6): 961-984 (2023)

[3] Mettildha M., Karuppasamy K. Adaptive Kernel Firefly Algorithm Based Feature Selection and Q-Learner Machine Learning Models in Cloud. Comput. Syst. Sci. Eng. 46(3): 2667-2685 (2023)

[4] Tong Ni. An Intelligent Retrieval Algorithm for Digital Literature Promotion Information Based on TRS Information Retrieval. Int. J. Inf. Technol. Syst. Approach 16(2): 1-14 (2023)

[5] Sabah Abdulazeez Jebur, Abbas Khalifa Nawar, Lubna Emad Kadhim, Mothefer Majeed Jahefer. Hiding Information in Digital Images Using LSB Steganography Technique. Int. J. Interact. Mob. Technol. 17(7): 167-178 (2023)

[6] Tomislava Vidic, Irena Klasnic, Marina Duranovic. Student Evaluation of Online Teaching Quality, Their Own Engagement and Success Expectancy in the Future Profession. Int. J. Emerg. Technol. Learn. 17(4): 135-147 (2022)

[7] Ehsan Ataie, Athanasia Evangelinou, Eugenio Gianniti, Danilo Ardagna. Erratum to: A Hybrid Machine Learning Approach for Performance Modeling of Cloud-Based Big Data Applications. Comput. J. 66(2): 524 (2023)

[8] Aakib Jawed Khan, Shabana Mehfuz. Fuzzy User Access Trust Model for Cloud Access Control. Comput. Syst. Sci. Eng. 44(1): 113-128 (2023)

[9] Munmun Saha, Sanjaya Kumar Panda, Suvasini Panigrahi. A modified Brown and Gibson model for cloud service selection. Int. J. Comput. Sci. Eng. 26(4): 430-444 (2023)

[10] Sivasamy R., Paranjothi N. Modelling of a cloud platform via M/M1 + M2/1 queues of a Jackson network. Int. J. Cloud Comput. 12(1): 63-71 (2023)

[11] Pasquale Cantiello, Beniamino Di Martino, Michele Mastroianni, Luigi Colucci Cante, Mariangela Graziano. Towards a cloud model choice evaluation: comparison between cost/features and ontology-based analysis. Int. J. Grid Util. Comput. 14(1): 15-28 (2023)

[12] Kshitij Goel, Nathan Michael, Wennie Tabib. Probabilistic Point Cloud Modeling via Self-Organizing Gaussian Mixture Models. IEEE Robotics Autom. Lett. 8(5): 2526-2533 (2023)

[13] Aida Lahouij, Lazhar Hamel, Mohamed Graiet. Formal reconfiguration model for cloud resources. Softw. Syst. Model. 22(1): 225-245 (2023)

[14] Baopeng Cheng, Yangwang Fang, Weishi Peng. Improved Sparrow Search Algorithm Based on Normal Cloud Model and Niche Recombination Strategy. IEEE Trans. Cloud Comput. 11(3): 2529-2545 (2023)

[15] Xiaofeng Wu. AHP-BP-Based Algorithms for Teaching Quality Evaluation of Flipped English Classrooms in the Context of New Media Communication. Int. J. Inf. Technol. Syst. Approach 16(2): 1-12 (2023)

[16] Feng Geng. Analysis of the teaching quality using novel deep learning-based intelligent classroom teaching framework. Prog. Artif. Intell. 12(2): 147-162 (2023)

[17] Yafeng Feng. An evaluation method of PE classroom teaching quality in colleges and universities based on grey system theory. J. Intell. Fuzzy Syst. 38(6): 6911-6915 (2020)

[18] Rongjun Chen, Xiaomei Luo, Qiong Nie, Leijun Wang, Jiawen Li, Xianxian Zeng. BP-CM Model: A teaching model for improving the teaching quality of IoT hardware technology based on BOPPPS and memory system. Educ. Inf. Technol. 28(6): 6249-6268 (2023)

[19] Mahmood Yenkimaleki, Vincent Heuven. Relative contribution of explicit teaching of segmentals vs. prosody to the quality of consecutive interpreting by Farsi-to-English interpreting trainees. Interact. Learn. Environ. 31(1): 451-467 (2023)

[20] Sofia Sivena, Yiannis Nikolaidis. Improving the quality of Higher Education teaching through the exploitation of student evaluations and the use of control charts. Commun. Stat. Simul. Comput. 51(3): 1289-1312 (2022)