Research Article

Effectiveness of Network Classroom Teaching Based on Genetic Algorithm

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In online classroom teaching, the function of teaching system can play an important role in the effectiveness of classroom teaching. How to use genetic algorithm to optimize online classroom teaching system has become a research hotspot. Based on genetic algorithm, this paper proposes an adaptive genetic algorithm model based on the traditional algorithm. After setting the appropriate mutation probability, the model can improve the convergence speed. Moreover, based on adaptive genetic algorithm, combined with the direct value method and BT neural network theory, this paper constructs the online classroom teaching quality evaluation model and the teaching system test paper data model, and optimizes adaptive mutation genetic algorithm and BP neural network to evaluate the teaching effectiveness. Simulation experiments are carried out based on the algorithm model, and the visual parameter values are obtained. After experimental comparison, the initial value of the mutation rate is set between 0.002 and 0.004. For the network classroom teaching system, this paper introduces the system demand analysis, function module design, and database design in detail. Finally, through the questionnaire survey, this paper understands the network situation of students in class and the use of online classroom teaching platform in detail, analyzes the problems and influencing factors of online teaching, and finally puts forward the strategies to improve the effectiveness of online classroom teaching.

1. Introduction

With the continuous development of Internet technology, educational informatization is becoming more and more mature [1]. The mode of online classroom teaching has been well known. Due to the impact of the COVID-19, most of the teaching has changed from traditional classroom to online classroom, and people have fully realized the importance of online teaching [2]. Online classroom teaching has changed the traditional teaching mode, method, and management means of teachers. At the same time, it has also played an important role in students’ learning style, motivation, and learning effect [3]. This teaching mode subverts the teaching and learning relationship between teachers and students in the traditional classroom, and breaks through the limitations of teaching time and teaching space. At the same time, the effectiveness of online classroom teaching is also affected due to the differences between online classroom and traditional classroom in teaching subjects, objectives, environmental carriers, and organizational forms [4]. At present, most online classroom teaching systems can only meet the needs of students’ course selection and cannot cover the needs of all students for learning knowledge, training, examination, and comprehensive education [5]. Especially in the test paper generation system, because the algorithm model is too backward, there is no way to meet the current teaching requirements, and the scientificity, rationality, and comprehensiveness of the test paper cannot match the current teaching content [6]. The limitations of online classroom teaching platform have hindered students’ learning motivation and cannot help students learn knowledge better. At the same time, because the online teaching platform cannot meet the teaching needs of teachers, the teaching quality has also decreased to a certain extent [7]. Therefore, how to improve the teaching quality is a problem that educational activities must face. How to evaluate the teaching quality scientifically and reasonably has become the focus of research [8]. The traditional teaching effectiveness evaluation
method is not suitable for online classroom teaching, so it is necessary to build a scientific and reasonable teaching effectiveness evaluation model to evaluate online teaching. Aiming at online classroom teaching, this paper applies the genetic algorithm model to the teaching evaluation and test paper design system, analyzes the influencing factors of the effectiveness of online classroom teaching, and puts forward the development strategy [9].

2. Related Work

The computational model of genetic algorithm is a method model to simulate biological evolution to obtain the optimal solution. At present, it has been widely used in various fields. The literature puts forward the complete structure and theory of genetic algorithm [10]. Later, more and more researchers carried out in-depth research on the promotion of genetic algorithm and the parameter control of coding mode, and obtained various genetic algorithms for deformation optimization. A crossover operator based on domain crossover is proposed in the literature. This algorithm model is applied to the crossover of individuals with genes represented by sequence numbers and can solve the TSP problem [11]. It has been verified by experiments. The random iterative genetic mountain climbing method proposed in the literature has also been verified. In addition, many experts and scholars have optimized and improved the crossover operator. The literature proposes that multi-population genetic parallel evolution can solve the local convergence problem of genetic algorithm [12]. A parallel genetic algorithm based on gene block coding is proposed in the literature. This algorithm can effectively solve the problem that simple genetic algorithm cannot search large-scale combinations efficiently. The literature proposes that the application of genetic algorithm in intelligent test paper generation can simulate the process of biological evolution, initialize the test questions in the test question bank through coding population and iterative operation, and finally get the optimal result [13, 14]. The literature summarizes four operation modes of online teaching platform, namely, asynchronous distance teaching, synchronous distance teaching, interactive real-time distance teaching, and comprehensive distance teaching [15]. In addition, it also describes in detail the operation mode and task purpose of each operation mode of teaching platform [16]. The literature proposes that the operation mode of interactive real-time distance teaching adopts high-speed network and video conference technology [17, 18]. According to the literature, the ultimate purpose of online classroom teaching is to break through the limitations of teaching space and extend teaching activities to different regions, hoping to educate students [19]. This method is quite different from the teaching organization form of traditional teaching and does not gather students scattered in various regions in one space for teaching. The literature puts forward a new definition of distance interactive teaching. In terms of teaching space and teaching practice, teachers and students have been in a semipermanent separation state. In terms of teaching effect, the evaluation mainly includes the design of teachers' teaching content, the learning services provided for students, and the thinking ability that students can obtain through teaching. In the construction of teaching platform, we should meet the interactive requirements between teachers and students and ensure the emotional connection between teachers and students. The literature studies and analyzes the effectiveness of distance teaching, and puts forward that academic knowledge such as mathematics and science is suitable for traditional teaching mode, and computer business and military knowledge are more suitable for distance teaching mode. The researcher’s view is that the purpose of distance teaching is not due to the development of teaching platform technology, but determined by the teaching methods of academic knowledge. This view can help the continuous improvement and development of distance teaching. According to the research on the construction of distance interactive teaching platform, the literature puts forward new design ideas and technical viewpoints. The literature holds that online classroom teaching should fully consider students' learning level, language level, input ability, and self-control ability. The literature suggests that the convenience of teachers and students should be considered in the system design of online teaching platform, as well as whether it can provide high-quality voice and video services.

3. Genetic Algorithm

3.1. Basic Principles. The basic theory of genetic algorithm is to simulate the mechanism of biological evolution and natural selection. After the survival of the fittest, the result of the problem will evolve in the continuous competition and finally get the optimal solution. The flowchart of standard genetic algorithm is shown in Figure 1.

3.2. Establishment of Teaching Quality Evaluation Model. The occurrence probability of mutation operation in traditional genetic algorithm is determined and unchanged. During the operation of the algorithm model, the mutation probability is determined and set according to the empirical value. However, in the actual natural environment, the variation probability is not invariable, and the variation probability will change with the change of the environment. This feature can help the continuous development of the population. Therefore, based on the traditional genetic algorithm, this paper proposes an adaptive mutation genetic algorithm (AGA), whose mutation probability is obtained through continuous experiments. In this paper, the calculation of adaptive mutation probability \( p \) is shown in the following formula:

\[
P = \frac{(P_1 + P_2)}{2} = \frac{P_0 - (P_0 - P_{\min}) \cdot (m/M) + P_0 \cdot \max_{X_e \in \Omega} \frac{F(X_e)/\Omega}{F}}{2}
\]

In this paper, BP neural network is optimized by genetic algorithm through adaptive lesions, and an adaptive mutation genetic algorithm optimized BP neural network
The model (AGA-BP model for short) is proposed. The model can optimize the weight and threshold of neural network, and solve the shortcomings of local minimum and slow search convergence. The trial-and-error method is one of the methods to determine the number of hidden layer nodes. Its initial value can be determined in three forms, as shown in the following formula:

\[ m = \sqrt{1 + n + l + a}, \]  
\[ m = \log 2^n, \]  
\[ m = \sqrt{nl}. \]  

The number of nodes in the output layer depends on the dimension of the target variable in the actual problem. The nonlinear transfer function is used. The more commonly used nonlinear transfer function is hyperbolic function, which is shown in formula (4):

\[ f(x) = \frac{1}{1 + e^{-x}} \]  

The neural network vector model with single hidden layer is adopted in this paper. The input vector is shown in formula (5):

\[ p = [p_1, p_2, \ldots, p_R]. \]  

The threshold vector is shown in formula (6):

\[ b_1 = [b_{1,1}, b_{2,1}, \ldots, b_{S,1}]. \]  

The intermediate calculation result, that is, the weighted sum formula connecting the weight vector and the threshold vector (8), is shown in the following formula:

\[ n1 = IW_1 p + b_1. \]  

Output vector is shown in the formula (8):

\[ n1 = IW_1 p + b_1. \]  

In this paper, the initial weight of the model is \(18 \times 5 + 5 = 95\), the threshold is \(5 + 1 = 6\), the coding length is \(95 + 6 = 101\), and the initial population is set to 20. The fitness function is shown in formula (9):

\[ \text{fitness} = \frac{1}{E} \]  

After calculating the probability of each individual being selected, it is necessary to determine whether the selected individual can continue to be inherited into the next generation of individuals according to the cumulative probability. The calculation formula is shown in formula (10):

\[ q(a_k) = \sum_{j=1}^{k} z(a_j). \]  

The normalized data are calculated by the direct value method, and the initial evaluation results are obtained. The calculation steps of the direct value method are as follows.
Standardization of original teaching quality evaluation data is as shown in equation (11):

\[ x_{ij}' = \frac{x_{ij} - \bar{x}}{s_j} \]  

In order to meet the requirements of logarithm in entropy method, the standardized value shall be translated, as shown in formula (12):

\[ Z_{ij} = x_{ij}' + A. \]  

The evaluation indexes of teaching quality are quantified in the same degree, as shown in formula (13):

\[ p_{ij} = \frac{Z_{ij}}{\sum_{i=1}^{m} Z_{ij} (i = 1, 2, \ldots, m; j = 1, 2, \ldots, n)}. \]

Entropy value of index \( J \) was calculated, as shown in formula (14):

\[ E_j = -k \sum_{i=1}^{m} p_{ij} \ln(p_{ij}). \]

The difference coefficient of index \( J \) is calculated as shown in formula (15):

\[ G_j = 1 - E_j. \]

The weight of the \( j \)-th index was calculated as shown in formula (16):

\[ w_j = \frac{G_j}{\sum_{j=1}^{n} G_j}. \]

The teaching quality of the \( i \)-th sample was calculated as shown in formula (17):

\[ F_j = \sum_{j=1}^{n} w_j p_{ij}. \]

The establishment steps of teaching quality evaluation model are shown in Figure 2. The model constructed in this paper shows the advantages of direct value method and AGA-BP algorithm:

1. AGA-BP algorithm model can realize nonlinear mapping within any accuracy. This model solves the problem of lack of horizontal comparison of direct value method.
2. The direct value method can reduce the error caused by human factors and provide powerful help for the design of neural network. The a priori guidance samples of the AGA-BP algorithm model can get the determined results through the initial evaluation of this method.
3.3. Self-Adaptive Test Paper Model. Genetic algorithm is used in generating test paper. Due to many constraints of traditional test paper methods, such as slow running speed due to long gene coding, it loses the significance of coding. Therefore, this paper adopts the grouping real number coding method of genetic algorithm, which mainly takes the question type as the unit to randomly generate the initial population, so as to simplify the genetic operation process and form test paper faster. The fitness function is shown in the following formula:

\[
\min (f(x)) = \max (-f(x)).
\]  

(19)

If the objective function is always positive, the fitness function problem is directly the objective function problem:

\[
F(x) = f(x).
\]  

(20)

In order to avoid falling into the local optimal solution, the basic fitness function is adjusted. Linear transformation is as follows:

\[
F(x) = \alpha f(x) + \beta.
\]  

(21)

Formula for determining coefficient is as follows:

\[
\alpha = \left(\frac{C_{\text{mult}} - 1}{f_{\text{avg}}} \right) \frac{f_{\text{avg}}}{f_{\text{max}} - f_{\text{avg}}},
\]

or

\[
\beta = \left(\frac{f_{\text{max}} - C_{\text{mult}} f_{\text{avg}}}{f_{\text{max}} - f_{\text{avg}}} \right) \frac{f_{\text{avg}}}{f_{\text{max}} - f_{\text{avg}}},
\]  

(22)

\[
\alpha = \frac{f_{\text{avg}}}{f_{\text{avg}} - f_{\text{min}}},
\]

or

\[
\beta = \frac{-f_{\text{min}} f_{\text{avg}}}{f_{\text{avg}} - f_{\text{min}}},
\]  

(23)

3.4. Algorithm Analysis. This paper uses MATLAB to simulate the algorithm, modifies the corresponding parameters, obtains different parameter values, and determines the initial value of the parameters through experimental comparison. When other parameters remain unchanged, the variation rate is 0.003. The influence of crossover rate on the convergence of genetic algorithm is shown in Figure 3.

As can be seen from Figure 3, the value of crossover rate can be preliminarily limited to 0.4–0.7.

Under the condition that other parameters remain unchanged, the crossover rate that can obtain the optimal solution in the above experiment is taken as 0.6. The schematic diagram of the influence of mutation rate on the convergence of the algorithm is shown in Figure 4.

Through the comparison between the two groups of experiments, the initial value of the variation rate is limited to 0.002–0.004.

4. Design of Network Classroom Teaching System Based on Genetic Algorithm

4.1. Teaching System Design

4.1.1. Teaching Management Module. The function of this module is composed of four modules: teacher management, teaching resource management, student management, and administrator module. The teacher management function needs to meet the needs of managing the role of teachers, the student management function needs to meet the needs of managing the role of students, and the administrator module function needs to meet the needs of managing teachers, students, and teaching resources. The teaching resource management module can design the attributes of labels to realize personalized teaching, such as labeling and classifying different teaching materials and contents. You can also use hierarchical settings for labels, set several primary labels through general direction classification, and then subordinate several secondary labels under the primary labels. After teachers label and classify different teaching resources, students can accurately obtain learning resources, so as to make rational use of teaching resources and realize personalized teaching.

4.1.2. Teaching Evaluation Module. The function of this module is composed of intelligent test paper generation and background monitoring. The intelligent test paper
generation of the system is realized through the improved
genetic algorithm. After combining the genetic algorithm
with the actual optimization, it can break through the
problem of multicondition constraints, realize the intelligent
test paper generation, and obtain the practical test paper
with reasonable question type, rich knowledge points,
moderate difficulty coefficient, and matching the expected
teaching objectives. Background monitoring can help
teachers master students’ learning, examination, and
classroom attendance, and feed back the data results to
students themselves to help teachers teach better and stu-
dents learn better.

4.1.3. Other Functional Modules. The function of this
module is composed of discussion management, classroom
Q&A, experimental practice, and sign-in management to
cooperate with the use of online classroom teaching system.

The main user roles are system administrator, teacher,
and student, which realize the functions of student man-
agement, teacher management, teaching resource manage-
ment, and course announcement management. After
teachers and students create accounts and log in to the
system, they can view and modify their own information. At
the same time, teachers and administrators can add, modify,
view, and delete student information after logging in to the
system. The main user roles are administrator, teacher,
and student, which realize the function of intelligent test paper
generation and background monitoring of teaching. Intel-
ligent test paper can realize the operation that teachers can
manually change the test paper parameters. Students can
modify the test difficulty, knowledge point range, and other
parameters. Moreover, it can display students’ learning, test
results, and classroom performance. After the examination,
the system can automatically mark the paper and summarize
the results, which can be fed back to teachers and students.

MySQL database is used in this paper. The specific
database table is as follows:

<table>
<thead>
<tr>
<th>Table 1: System course information.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
</tr>
<tr>
<td>------------------------------------</td>
</tr>
<tr>
<td>Id</td>
</tr>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Video_url</td>
</tr>
<tr>
<td>Kejian_url</td>
</tr>
<tr>
<td>Zhuti</td>
</tr>
<tr>
<td>Yingyong</td>
</tr>
<tr>
<td>Difficulty</td>
</tr>
<tr>
<td>Specially</td>
</tr>
<tr>
<td>Teacher</td>
</tr>
<tr>
<td>Popularity</td>
</tr>
<tr>
<td>Image_url</td>
</tr>
<tr>
<td>Create_time</td>
</tr>
</tbody>
</table>

(2) System User Table. It can store the user’s relevant in-
formation, which is composed of the user’s ID primary key,
role information, gender, telephone, and other information.
In addition, it includes the user’s knowledge, the user’s
learning expectation, teaching objectives, and the user’s
expectation difficulty. The specific information is shown in
Table 2.

(3) Examination Information Table of the System. It is
composed of test paper ID primary key, test question ID, test
name, student name, student answer, test question answer,
test question type, total score, and other information.
Specific information is shown in Table 3.

4.2. Design of Test Paper Generation System

4.2.1. Teachers’ Demand for Questions. The test question
bank needs to meet the requirements of content sharing,
efficient question generation, and meeting the standards and
can realize effective management and maintenance. The test
questions and answers in the test question bank can meet the
query needs of teachers at the same time, and users can
obtain specific topic content through certain query condi-
tions. In addition, the system also needs to build a reasonable
comprehensive evaluation system, which can correctly judge
the rationality of the test paper and the comprehensive
ability of students, and change the previous single evaluation
standard of teachers relying on personal experience. The test
paper generation system needs to meet the above functional
requirements, achieve objective, fair and reasonable test
paper evaluation, and obtain reasonable analysis results.

4.2.2. Student Training and Examination Function. The student training function refers to helping students train
various knowledge points before the examination. The
training module can not only label and classify different
knowledge points but also help students review better
through the examination outline. Therefore, the student
training module needs to be interactive and operational, and
can meet the learning and operation of students of different
majors and ages at the same time. In addition to the final
examination, phased examination training can also be
added. This intensive training can help students consolidate the learning content of the stage and carry out targeted review and training. The simulated examination is also an essential function of student training. Before the final examination, the simulated examination helps students better master the knowledge points of the examination outline. The simulated examination questions should be similar to the real questions. They should meet the examination needs of students in terms of knowledge point coverage, topic type, and examination difficulty, so as to simulate the real examination situation to the greatest extent. The examination function refers to that the background personnel can directly monitor the examination status of students, prohibit any cheating, and achieve the goal of invigilating the examination.

4.2.3. Background Monitoring and Marking Function. Background monitoring function, on the one hand, refers to that the teacher can monitor the students’ examination status in real time during the examination process, and can also track the students’ examination status after the examination. Through the operation, we can obtain whether the students are taking the examination or have taken the examination operation. Students’ login information, such as login time and login IP address, can be obtained. In addition, if a student is found cheating in the examination, the teacher can force the student to end the examination. On the other hand, it means that teachers can master the learning situation of students in the background system. The system needs to accurately record the learning content and learning time of students every time and summarize them automatically. Students’ learning efficiency and learning time can directly affect students’ learning situation.

The marking function refers to that when the students finish the examination, the system can mark the examination papers automatically and generate the examination results. Students’ test scores can be automatically fed back to students and teachers, and both students and teachers can view the test answer records. The system can also realize the analysis of students’ scores and help students and teachers accurately judge the examination results and learning quality.

The test paper generation system consists of 12 modules, including collective management, project management, marking module, test question management, role management, and system maintenance module. The student side modules include training module, operation training

<table>
<thead>
<tr>
<th>Title</th>
<th>Data type</th>
<th>Whether it is empty</th>
<th>Annotation</th>
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<td>User ID</td>
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<tr>
<td>Username</td>
<td>varchar(100)</td>
<td>No</td>
<td>Account</td>
</tr>
<tr>
<td>Password</td>
<td>varchar(200)</td>
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<td>Password</td>
</tr>
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<td>Character name</td>
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</tr>
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<td>ID card</td>
</tr>
<tr>
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<td>Date</td>
<td>Yes</td>
<td>Birthday</td>
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</tr>
<tr>
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<td>int(11)</td>
<td>No</td>
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<td>Yes</td>
<td>Only</td>
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<tr>
<td>Degree</td>
<td>int(11)</td>
<td>Yes</td>
<td>degree of difficulty</td>
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<table>
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<th>Title</th>
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<th>Whether it is empty</th>
<th>Annotation</th>
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<td>Test papers ID</td>
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<td>Yes</td>
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<tr>
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</tr>
</tbody>
</table>
module, simulated examination module, online examination module, and personal center management. Each module has a clear division of labor and smooth operation. The system function module diagram is shown in Figure 5.

5. Strategies for Improving the Effectiveness of Online Classroom Teaching

5.1. Problems in Online Classroom Teaching. The most widely used operation mode of online classroom teaching is live teaching, which has particularly high requirements for network conditions. The network condition of teachers and students is the premise of live teaching and plays a key role in the effectiveness of teaching. Online teaching classroom can guarantee normal teaching only under good network conditions, and teachers and students can carry out teaching activities. Therefore, this paper understands the network situation of students' network classroom teaching in detail through questionnaire survey. The specific situation is shown in Table 4.

<table>
<thead>
<tr>
<th>Option</th>
<th>Option content</th>
<th>No.</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>The network is very process, very satisfied</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>B</td>
<td>The Internet occasionally kattop, more satisfied</td>
<td>39</td>
<td>39</td>
</tr>
<tr>
<td>C</td>
<td>The network condition is average, general</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>D</td>
<td>The Internet is often stuck, and I am not satisfied with</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>E</td>
<td>The network card is serious, very dissatisfied</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

It can be seen from Table 4 that the network condition is not the main factor affecting students' learning. Most students have good network condition and can smoothly participate in online classroom teaching. Online classroom teaching platform is the basis of effective teaching. This paper conducts a student satisfaction survey on the six basic functions of online classroom teaching platform, as shown in Table 5.

<table>
<thead>
<tr>
<th>Function</th>
<th>No.</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course playback</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>Examination Q &amp; A</td>
<td>39</td>
<td>39</td>
</tr>
<tr>
<td>Online listening</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Online interaction</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>After-school homework submission</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

and “online listening” basically achieve students' learning objectives. The two functions with the lowest satisfaction are “online interaction” and “after-school homework submission.”

5.2. Influencing Factors of Online Classroom Teaching. Students’ autonomous learning ability is one of the factors affecting the effectiveness of online classroom teaching. This ability is analyzed from four dimensions: basic ability, comprehensive ability, sincere ability, and aggressive ability, mainly cognitive ability, self-organization ability, independent thinking, and learning ability and self-control ability. Changing from traditional classroom to online classroom teaching has brought great challenges to teachers’ professional quality and information literacy. Teachers’ professional quality is mainly reflected in teaching philosophy, professional knowledge literacy, teaching ability level, professional ethics level, and information literacy. Among them, teachers’ information literacy is the basic ability that contemporary teachers must have. With the continuous development of global informatization, teachers must master certain information technology, which is reflected in the cultural level of knowledge, information skills of ability, and positive consciousness of spirit.

The teaching environment of online classroom teaching and offline teaching has changed greatly. Therefore, the organizational form and teaching mode of online teaching are not suitable for the traditional supervision and management system, which poses a great challenge to the daily teaching management and supervision of the school. In different learning environments, students interact with
teachers through the screen to complete their learning. Teachers and school management cannot maintain classroom order in real time. Therefore, management supervision has become an important part of teaching.

5.3. Strategies to Improve the Effectiveness of Online Classroom Teaching. Students need to improve their autonomous learning ability. They can continuously improve their autonomous learning ability and self-control ability by formulating appropriate learning objectives and learning plans. Teachers and parents should increase the number of interactions and help students form a good habit of self-discipline. Through the method of home school linkage, we help students make reasonable learning plans, guide students to study consciously, and improve their self-control ability. The interaction between teachers and students is the influencing factor for the improvement of students’ learning quality; especially, after the emotional connection between teachers and students is established, it can promote students’ learning enthusiasm. Therefore, teachers can strengthen the communication between teachers and students through online classroom teaching. In addition to the communication of learning content, there should also be emotional practice to establish a stable and solid relationship between teachers and students, which can help teachers create a positive classroom atmosphere and improve the effectiveness of online classroom teaching. In addition, students should also improve their ability to obtain information and data analysis, and improve the level of information retrieval and identification through certain learning, or students can independently obtain learning information and learning resources through the Internet platform.

To improve the effectiveness of online classroom teaching, teachers’ qualification is a crucial factor. We should strengthen the operation skills and knowledge training of teachers’ online classroom teaching platform, constantly improve teaching efficiency, improve teaching ability, and master various functional modules of online teaching software. Teachers should adhere to the good concept of continuous learning, actively improve their knowledge, and be able to help students better complete their studies through the online teaching platform. At the same time, they should strengthen the communication and interaction with students’ parents, establish emotional ties with students, and create a positive, harmonious, and stable online parent classroom atmosphere. In addition, teachers must have the ability to deal with emergencies on the online teaching platform and can quickly solve the problems of jam, paralysis, inability to video, and so on. Through continuous learning, we can improve the informatization level of teachers and the utilization efficiency of online teaching platform, which is conducive to improving the effectiveness of online classroom teaching.

The management department should improve the construction level of online classroom teaching platform, constantly improve the function of teaching platform, ban online teaching platforms that do not comply with laws and regulations or affect normal teaching, integrate and optimize online platforms that comply with educational laws, and constantly improve the quality and effectiveness of online classroom teaching. We should strengthen the research of online classroom teaching, constantly improve the online teaching mode and teaching methods, put forward the theoretical guidance of online classroom teaching based on theoretical and practical experimental research, and reasonably design online classroom teaching activities. We should constantly strengthen the development and utilization of online classroom teaching resources, change the traditional utilization mode of teaching resources, constantly improve the utilization efficiency of online classroom teaching, and give full play to the advantages of online classroom teaching resources. We should establish a scientific teaching management mechanism, constantly improve the management level, and strengthen the supervision and management of online teaching. At the same time, we should timely adjust the online teaching plan and rhythm in combination with the actual teaching situation and the needs of teachers and students.

6. Conclusion

In this paper, the BP neural network is optimized by genetic algorithm, the BP neural network model optimized by adaptive mutation genetic algorithm is proposed, the teaching quality evaluation model is established, the grouping real number coding method of genetic algorithm is adopted, and the mathematical model of test paper generation is constructed. According to the characteristics of network classroom teaching, this paper analyzes the system design requirements of teaching system and test paper system, and designs the teaching management module, teaching evaluation module, and other functional modules of teaching system, as well as the teacher side and student
side functional modules of test paper system. Through a questionnaire survey, the students’ network status and six functions of the teaching platform of online classroom teaching are investigated. Most students have good network status, and there are no problems affecting teaching. The “course playback,” “learning resource upload and download,” “examination and Q & A,” and “online listening” of the teaching platform basically meet the needs of students, and only the “online interaction” and “after class homework submission” have the lowest satisfaction. Finally, this paper analyzes the main influencing factors of the effectiveness of online classroom teaching, mainly including students’ autonomous learning ability, teachers’ professional development level, and school supervision and management. Based on the three dimensions of students, teachers, and management departments, this paper puts forward strategies to improve the effectiveness of online classroom teaching, which lays a theoretical foundation for the improvement of the effectiveness of online classroom teaching.

**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 conflicts of interest.

**References**


