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Research Article

Evaluation Index of Basketball Teaching Environment Based on the Wireless Communication Network and Genetic Algorithm

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With the advent of the new era, all fields in China are full of vitality. In particular with the vigorous development of network science and technology, many fields are going through a huge change or in the near future. As an important part of the development goal of China's "sports power," physical education is also undergoing changes. With the successful conclusion of the Winter Olympics in China, this grand event has added an important stroke to the development of sports in China. In the process of physical education and teaching, the environment of physical education is extremely important. Compared with nonphysical education subjects, it has the characteristics of direct contact between teachers and students and the time of the course teaching process. This paper studies the evaluation index of basketball teaching environment. As a part of physical education environment, it has the general characteristics of physical education environment, but it has its own characteristics. People in the environment are constantly experiencing the influence of the environment on their own individual. Therefore, the research on the evaluation indicators of the basketball teaching environment will play an important role for the students involved. For the research of the mentioned basketball teaching environment evaluation index, this paper proposes the application of genetic algorithm and wireless network technology; the purpose is to make a more scientific and comprehensive target evaluation system for the basketball environment evaluation index. In the simulation experiment of the teaching environment evaluation index, this paper selected a total of 164 people of different grades. The final result showed that 85.16% of the students gave positive comments to this evaluation system. This result confirms the research of this paper.

1. Introduction

Since the 2008 Olympic Games, China's sports field is entering a new stage, and China has made "sports power" one of the country's important development goals. Coupled with the fruit of the development of the era of the growing maturity of wireless network technology, it provides a good technical and era foundation for the reform of the physical education environment. In physical education, the environment of physical education has a greater impact on the individuals involved, which is a major feature of the discipline, because the environment in which the individual in physical education is located is very open, which makes the physical education environment more disturbing than other disciplines. In view of the characteristics of this problem, it is necessary to make a more scientific judgment on the evaluation indicators of the physical education environment.

The research on the evaluation index of basketball teaching environment in this paper is an important example of the research on physical education teaching environment. Basketball, as an extremely wide range of sports and fitness activities, is very attractive to a large number of people. And this sports project has become one of the important activities of the campus sports project. Therefore, the basketball teaching environment as the object of this experiment has great practical significance. Moreover, in order to better put forward more scientific and complete evaluation indicators for the basketball teaching environment, this paper will carry out related research on the indicators of basketball teaching environment evaluation based on wireless communication network technology and genetic algorithm.

There have been many studies on the teaching environment, with different research methods and perspectives for different researchers. The following is the relevant research results of

some researchers. Sujar et al. proposed new software for medical students to monitor the teaching environment, so as to provide protection for the dangers that may be encountered in the learning process [1]. Okoye and his team conducted related experiments in the teaching environment from the perspective of medical psychology. The results show that students perceive the learning environment more positively than negatively [2]. In addition to the mentioned related research on medicine, Claro et al. had conducted related research on defining the Teaching and Learning in the Digital Environment (TIDE) competency structure and developing performance-based tests. The result is to improve the teachers' abilities in information and communication tasks [3]. Contreras et al. focused on technologies such as virtual reality, augmented reality, and mixed reality and conduct related research. The purpose is to address the changes in the teaching environment caused by the COVID-19 pandemic around the world [4]. Also in medicine, CAGA had made related research on the teaching environment of robots, by observing the language and behavior of the attending surgeon during the inpatient robot dissection process. It described the teaching techniques used in robotics teaching environments [5]. On the training mechanism of programmers, Ahoud et al. explored the impact of guiding metacognitive feedback on novice programmers in the context of teachable agents. They eventually built an online learning environment that could facilitate the learning of novice programmers [6]. Procaccini put forward that strategic questioning is a very valuable teaching method in the clinical teaching environment through the research on the medical education environment [7]. Green et al. designed and evaluated an innovative curriculum to address some of the problems encountered by surgeons. The mentioned studies are mainly aimed at the teaching environment of the medical field and the learning environment of the novice, but few of these studies involve the part of physical education. And it has not yet made use of the corresponding achievements of advanced disciplines and science and technology in today's society.

The innovation of this paper is as follows. (1) This paper puts the environmental research of education and teaching into the process of physical education. This is the improvement of the teaching environment evaluation index research, and it has made a good supplementary role for the whole teaching environment research. (2) This paper studies the relevant systems and models of contemporary advanced wireless communication network technology in the evaluation index of basketball teaching environment, which builds a scientific platform for the entire research. (3) At the same time, the genetic algorithm is used in the research on the evaluation index of basketball teaching environment. In the end, the selection of the optimal index in the evaluation index of basketball teaching environment can be obtained.

2. Teaching Environment Evaluation Method Based on the Wireless Communication Network and Genetic Algorithm

2.1. Application Method of the Wireless Communication Network. With the rapid development of wireless communication network science and technology, corresponding in-depth research has been carried out on its application in many fields. Because wireless communication relies on electromagnetic wave signals to transmit information and realize a communication method of information exchange, this feature makes wireless communication have great spatial mobility and greatly improves the convenience of people's communication [8, 9]. The wireless communication network can be further subdivided into cellular mobile communication systems, cluster scheduling mobile communication systems, satellite communication systems, radio paging systems, and broadband wireless access systems. For people nowadays, with the popularization of mobile communication devices and the vigorous construction of wireless communication networks, most of the networks we can access for wireless communication are cellular mobile communication networks [10]. The corresponding research is carried out.

(1) Wireless communication network

With the popularization of mobile Internet and smart mobile devices, people's daily needs and requirements for wireless communication networks are increasing day by day. Correspondingly higher requirements are also put forward for the architecture of wireless communication networks, because a large number of people join the Internet user groups, which is making the traditional wireless communication network bear more pressure [11]. Therefore, this paper proposes a new type of wireless communication network and a new heterogeneous communication network in which multiple network architectures coexist. Its architecture is shown in Figure 1.

Figure 1 is a depiction of the current new wireless communication network. The flow in the above figure includes a macrocell, microcell, picocell, femtocell, relay, and Device-to-Device (D2D). It can be seen from the figure that compared with the previous communication network, the new communication network can increase the capacity of the network bearer. And the area covered by the network will be larger, which can provide network support for more people at the same time. At the same time, it can also improve the high-frequency spectrum of the wireless communication network to a certain extent. The final result of this is to improve the performance of the wireless communication network as a whole.

In addition to the introduction of the wireless communication network of the mentioned new architecture, the architecture of the cellular network will be introduced. The architecture of wireless cellular network is characterized by a core network architecture based on IP [12]. Its structure diagram is shown in Figure 2.

The wireless cellular network is a major foundation for the establishment of a communication network, and its characteristic is to connect the user terminals of the network with various mobile IPs on the wireless network. It is composed of the core network part and the access network part. It has low cost for operators, low operating conditions, and transmission characteristics that can pass through the network for users of the terminal. It has the advantages of getting a better online experience and so on.

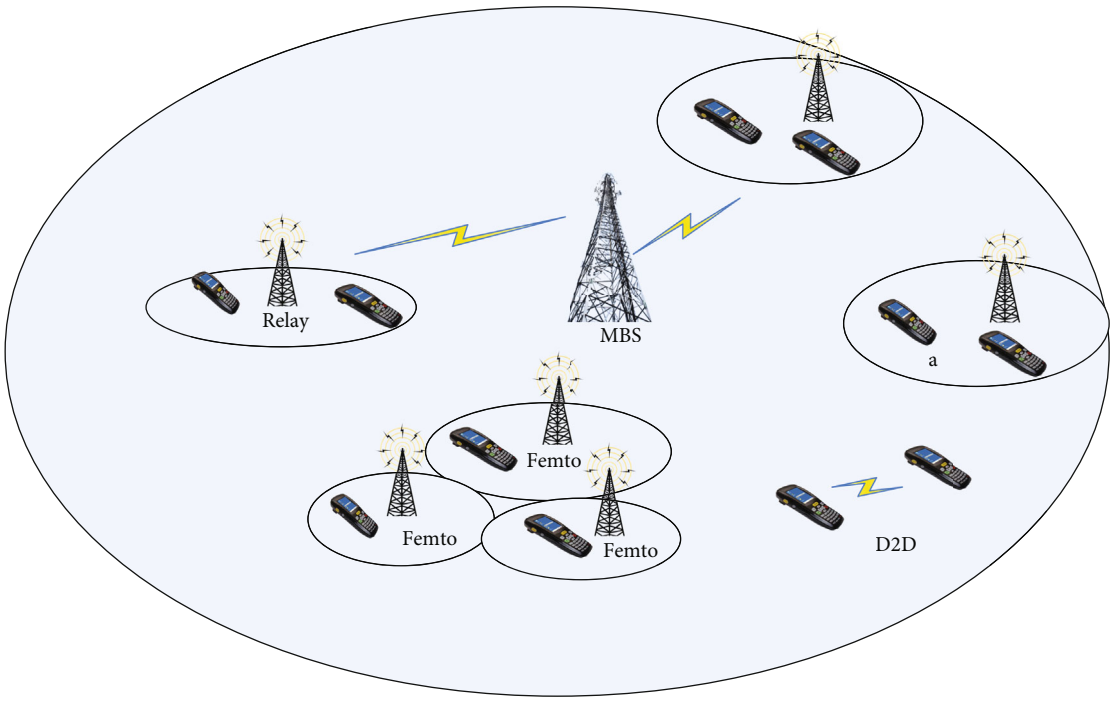

Figure 1: Structure diagram of various wireless networks.

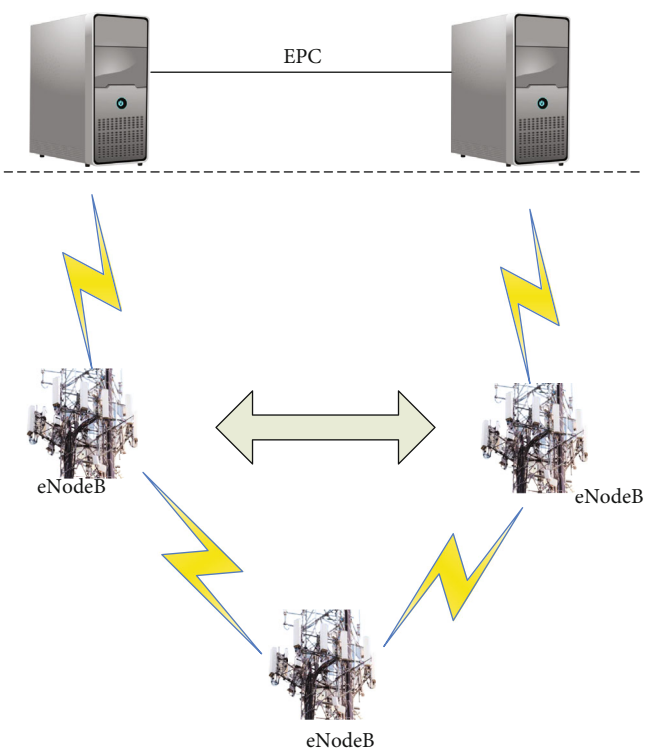

Figure 2: Wireless cellular network structure diagram.

(2) Introduction of an information channel of the wireless communication network

An important part of the wireless communication network is the transmission channel of the information on the communication network. This channel is a transmission medium between the transmitter and the receiver, and it is the main carrier of information transmission [13]. Therefore, the construction of the information transmission channel is good or bad, which will directly have a greater impact on the transmission of information. It will eventually lead to the user's sense of online experience. When the network signal is sent from the transmitter, it usually needs to pass through a complex information path before it can be received. Due to the complexity of the pathway, there is a gradual decay of the signal. During the transmission process of the signal from the transmitter to the receiver, it has to go through various complicated transmission paths. Due to different terrains and the existence of obstacles, phenomena such as reflection and diffraction will occur. Its characteristics are shown in Figure 3.

Because in the actual signal transmission process, a large number of obstacles will be encountered, the fading process is also different. Figure 3 more objectively reflects the attenuation process of the signal. As can be seen from Figure 3, when the signal has large-scale attenuation, the frequency of the signal will gradually decrease, but the amplitude of the change is relatively stable. For small-scale attenuation, there will be unstable attenuation. Therefore, it is necessary to make corresponding research on the transmission of the signal in the ideal state first. Its expression formula is as follows:

$$Q_R(S) = \frac{Q_t B_t B_R \beta^2}{(4\pi)^2 S^2 l}. \tag{1}$$

The study of signal transmission under ideal conditions can make the study of signal transmission characteristics more rigorous. The above formula is a formula model for the signal

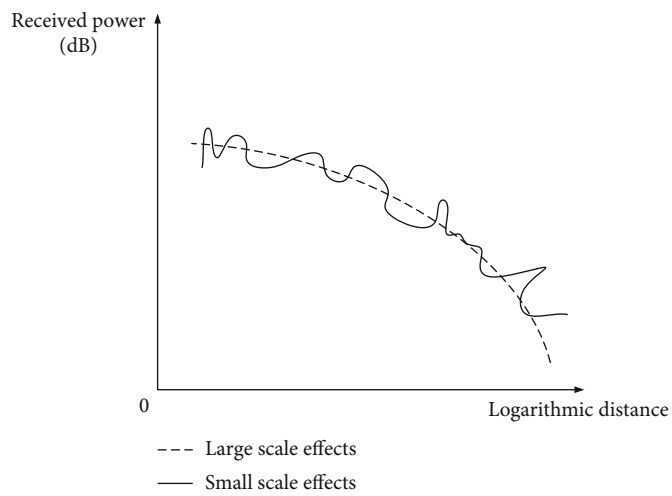

Figure 3: Signal attenuation process of wireless communication.

transmission without obstruction. The characteristic of its transmission is the attenuation process of large-scale effects, and S in the formula refers to the distance between the signal transmitter and the receiver. Q_t is the power of the signal transmitting end, and Q_R represents the power value of the signal receiving end [2].

The above is the research method for the ideal model of large-scale effects. The research method for the small-scale attenuation of the signal is as follows. The attenuation of small-scale effects in the signal transmission process is due to the change in the position of the transmitter of the signal relative to the receiver of the signal. Coupled with the common influence of various external factors, it will make the signal change rapidly, and its formula is as follows:

$$f(l) = \frac{a}{\lambda^2} \exp\left[-\frac{x^2+y^2}{2\lambda^2}\right] r_0\left[\frac{qb}{\lambda^2}\right], \quad q \geq 0. \tag{2}$$

The q in the above formula represents the change of the signal amplitude during the signal transmission process, λ^2 represents the variance, and b represents the value of the sight distance. The above formula is a related expression of the Rice distribution. The mentioned signal transmission process is information transmission including line-of-sight. When line-of-sight transmission does not occur during signal transmission, its expression is as follows:

$$f_0(l) = \frac{q}{\lambda^2} \exp\left[-\frac{x^2}{2\lambda^2}\right], \quad q \geq 0. \tag{3}$$

The above formula is a formula for signal attenuation that does not include line-of-sight transmission of the signal. It is aimed at the situation where there is only one information transmission channel.

Both the large-scale attenuation effect and the small-scale attenuation effect of the above signal transmission process are related methods aimed at only a few interference factors in the signal transmission environment. It is characterized by a better understanding of the objective effects of some important causes affecting signal transmission. However, the research methods for the attenuation of the actual network signal transmission process are somewhat different from them. Its expression model formula is as follows:

$$\begin{aligned} S(\mathrm{dB}) = {} & 71.2 + 26.15 \log f_1 - 13.53 h_{ta} - y\left(h_{qa}\right) \\ & + \left(44.1 - 6.54 \log h_{ta}\right) \log c. \end{aligned} \tag{4}$$

In the expression f_1 of the above formula, the amplitude value of the information carrier, h_{ta} is the effective height of the antenna of the transmitting base station, and h_{qa} is the effective height of the antenna of the signal receiving end.

(3) Power control method of the wireless communication network

The process of constructing the entire wireless communication network requires higher power than traditional communication technologies, so the power of the wireless communication network needs to be rebuilt. In the current network environment, the wireless communication network is widely deployed due to the addition of a large number of users and the construction of base stations. If the traditional power control technology is still used, there will be a problem of adaptation between the architectures of the new network and the degradation of the use experience. Of course, the solution to the power problem in the signal transmission process is ultimately for a better experience of the terminal [14]. For the power control of the signal transmission process, the amplification factor of the channel between the signals should be discussed first, and its relationship with the transmit power of the signal and the received power of the signal is as follows:

$$P = \frac{S_0}{S_T}. \tag{5}$$

S_0 in the above formula represents the power value when the signal is received, and S_T is the power value when the signal is transmitted. This formula reflects the relationship

between the amplification factor of the signal-to-signal path and the power during signal transmission. The above formula is applied below, and its expression is as follows:

$$P_{i,j} = \frac{p_{i,j} m_i(i,j)}{\left[\sum_{b=1}^{a} \sum_{l=1}^{a_b} p_{b,l} m_i(b,l) - P_{i,j} m_i(i,j) + \varepsilon_{i,j}\right]}. \quad (6)$$

a in the above formula represents the number of small areas included in the wireless communication network, and $P_{i,j}$ represents the ratio of the information magnification of the user's information path. $\varepsilon_{i,j}$ represents the hot and dry sound at the receiver end of the information base station. Through the deformation of the above formula, the following expression can be obtained:

$$P_{i,j} = \frac{p_{i,j}}{\left[\sum_{b=1}^{a} \sum_{l=1}^{a_b} p_{b,l} n_i(b,l) - P_{i,j} + \beta_{i,j}\right]}. \quad (7)$$

$n_{i,j}$ in the above formula represents the expansion multiple of the user's actual information channel. The above formula needs to reach an objective value to achieve the final required quality of service.

For the construction of a new wireless communication network, it is necessary to always consider the control of its actual power. Therefore, for the new wireless communication network, it is necessary to control the characteristics of each part participating in the networking [15]. The records of their respective physical properties are shown in Table 1.

Table 1 includes a summary of the characteristics of the macro base station, the two types of cells, the relay base station, and the end user's home base station. For the scientific regulation of the above parts, it can improve the final output quality.

(4) Planning and measurement method of the wireless communication network

The necessity of wireless communication network planning in today's era is self-evident. Due to the explosion of a large number of network users and the rapid expansion of wireless communication networks, the overall bearing requirements of wireless networks have been greatly improved. Two different standards are introduced below to provide some reference for network planning and design. The first is the introduction of the design criteria for the frequency spectrum. The first criterion of the frequency spectrum is the amount of information transmitted per unit time, and its expression is as follows:

$$G \le S \log_2\left(1 + \frac{m}{n}\right). \quad (8)$$

G in the above formula represents the capacity of the wireless communication network, S represents the bandwidth of the information system, and m/n represents the ratio of information to noise. The above formula is an expression derived based on the ideal situation, so it can theoretically be applied to various situations. It includes applications for cellular systems, relay networks, ad hoc networks, etc. But for actual usage, it needs to use the following formula:

$$G = S \log_2\left(1 + \frac{\mu r p}{\rho S}\right). \quad (9)$$

S in the above formula represents the size of the frequency difference of the information system, and the p value represents the size of the transmission power of the information transmitter. Formula (9) is an expression when the characteristics of the information channel are considered. In addition, the size of the frequency spectrum efficiency, that is, the size of the frequency difference between the unit information, is the amount of information throughput of the network system. It can be expressed by the following formula:

$$\beta = \frac{G}{S} = \log_2\left(1 + \frac{\mu r p}{\rho S}\right). \quad (10)$$

The purpose of the above formula is to increase the size of the capacity value of the entire system. This is done to measure and judge the bandwidth usage. In addition to the mentioned formula, there is also the following evaluation standard, which is a measure of the carrying capacity per unit area and frequency band [16]. Its expression is as follows:

$$\phi = \frac{\int_0^T (1 + R_V) Q(R_V) dR_V}{\pi L^2}. \quad (11)$$

L in the above formula represents the size of the radius of the coverage area of the base station. R_V represents the ratio of information to noise.

In addition to the mentioned determination index of the frequency spectrum, the control of the energy consumption of the wireless communication network should also be considered. The definition formula for this criterion is as follows:

$$L = \frac{1}{2} \log_2\left(1 + \frac{q}{\rho S}\right). \quad (12)$$

q in the above formula is the power value required by the signal transmitter, S represents the value between the high and low frequencies of the signal, and ρ represents the density of the interference noise frequency of the information. Assuming that the degree of freedom per unit time is $2S$, the energy efficiency formula is expressed as follows:

$$\alpha = \frac{G}{B} = \frac{2L}{\rho\left(2^{2L} - 1\right)}. \quad (13)$$

It can be seen from formula (13) that the value of α changes with the change of L, increases with the increase of L, and decreases with the decrease of L. Formula (13) is deduced based on theory, but after considering other interference losses and circuit power consumption, the resulting energy efficiency formula is as follows:

$$\alpha = \frac{G}{p + p_0} = \frac{2SL}{\rho S\left(2^{2L} - 1\right) + p_0}. \quad (14)$$

Table 1: Characteristics of each part of the new wireless communication network.

	Transmit power	Coverage	Main feature
Macro base station	48	1 K-24 K	Provide open access services in a wide range
Microcell	30-33	100-1.1 K	Increase wireless coverage and improve service density
Picocell	25-31	<310	Improve signal coverage in hotspot areas
Femtocell	<24	<50	Serve certain active users in a home or business
Relay	32	350	Expand coverage and improve communication quality in blind areas

p_0 in the above formula represents the power consumption of the entire network circuit, and $p + p_0$ represents the sum of the power of the signal transmitter and the power consumption of the circuit. In addition to the mentioned measurement standards, a standard is introduced below, and its formula is as follows:

$$\alpha = \frac{G}{p \cdot S} = \frac{2L}{\rho S\left(2^{2L} - 1\right)}. \tag{15}$$

The above formula is to connect the formula of frequency spectrum efficiency and the formula expression of energy efficiency and then judge the wireless communication network. This formula is a definition for the rate at which signal transmission consumes power.

2.2. Genetic Algorithm Theory and Application Methods. The genetic algorithm is derived from the long-term observation of the biological world. The most important point in the biological world is the reproduction of the biological itself. At first, people just observed the genetic replacement between organisms and finally came to the concept of "natural selection, survival of the fittest" in the biological world. The most important of these is the genetic relationship between organisms. The earliest use of the genetic algorithm was used in computer to simulate natural evolution, and the principle of the genetic algorithm was not used in artificial systems [17]. It was not until later that some scientists realized that if there is an algorithm that conforms to the theory of evolution to combine with the actual operation, the workload will be reduced, and the genetic algorithm began to enter the research stage.

(1) Basic theory of the genetic algorithm

The basic idea of the genetic algorithm is basically consistent with the evolution of organisms in nature. This is not only the source of its name but also the source of the construction ideas of its algorithmic process. This algorithm is different from the traditional algorithm that focuses on the characteristics of spatial information. It pays more attention to the characteristics of the fitness of the samples, and its process is consistent with the survival of the fittest in the biological evolution process [18]. The basic concepts involved in the genetic algorithm are shown in Figure 4.

The specific connotation of the genetic algorithm is to combine the basic principle of survival of the fittest in nature and the mechanism of chromosome exchange within species population to design the algorithm. This algorithm also includes a fitness function algorithm. The individuals in Figure 4 represent points in the search space. A population represents a set of solutions in a genetic algorithm. Genes are the characters of the entire algorithm string. In addition, the genetic algorithm also has the characteristics of robustness, heuristic, globality, and parallelism [19]. Robustness is obtained by referring to the fitness function. The fitness function is a criterion for evaluating the individual (the solution to the problem). Unlike traditional algorithms, the fitness function does not need to be continuously differentiable, and the domain of the function is not constrained. Heuristic means that the algorithm does not have a fixed direction guide during the running process, and the population samples will move in a better direction in general. Globality is the treatment of the population (the set of solutions to the problem); i.e., it evaluates and processes multiple solutions simultaneously, which means that it can search for multiple peaks simultaneously. The final parallelism refers to the processing of multiple peaks. In this process, each peak can actually be regarded as an independent search domain, and the genetic algorithm operations are performed in their respective domains, and the operations are independent of each other.

(2) The process of the genetic algorithm

Due to its own process and the mentioned various characteristics of the genetic algorithm, many algorithms have used it as the underlying basic algorithm to build their own foundation. The purpose of the genetic algorithm is to obtain the final optimal solution. Its specific flowchart is shown in Figure 5.

Figure 5 is the specific flow of the genetic algorithm. The first step is to analyze the given steps. The purpose of this is to determine the coding method of the algorithm to solve the problem, as well as the parameters required in the operation process. This is the first operation. The second step is to input the problem into the search space to generate sample individuals and an initial population. The third step is to use the fitness function to calculate the fitness of each individual. The fourth step is to carry out the related work of the genetic operator for the population that has been obtained. Finally, the individual with the highest fitness in the output population is the final solution [20]. Its formula is defined as follows:

$$\mathrm{GA} = (A, B, C, D, E, F, G, H). \tag{16}$$

A in the above formula represents the individual labeling method, B represents the function of the individual's adaptation in the group, C refers to the initial group, and D is the size

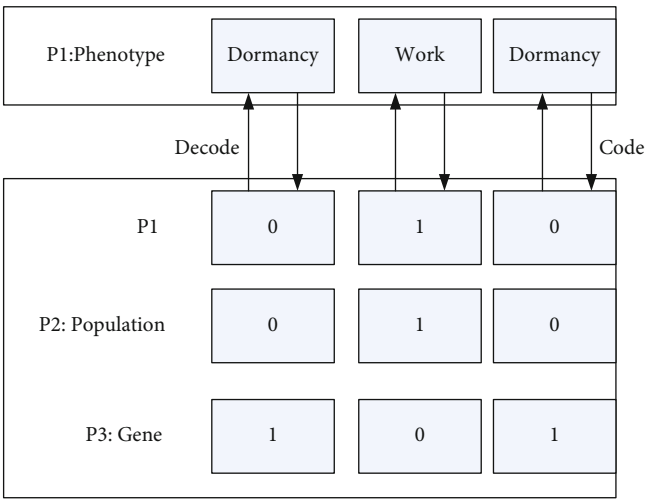

Figure 4: Basic conceptual diagram of the genetic algorithm.

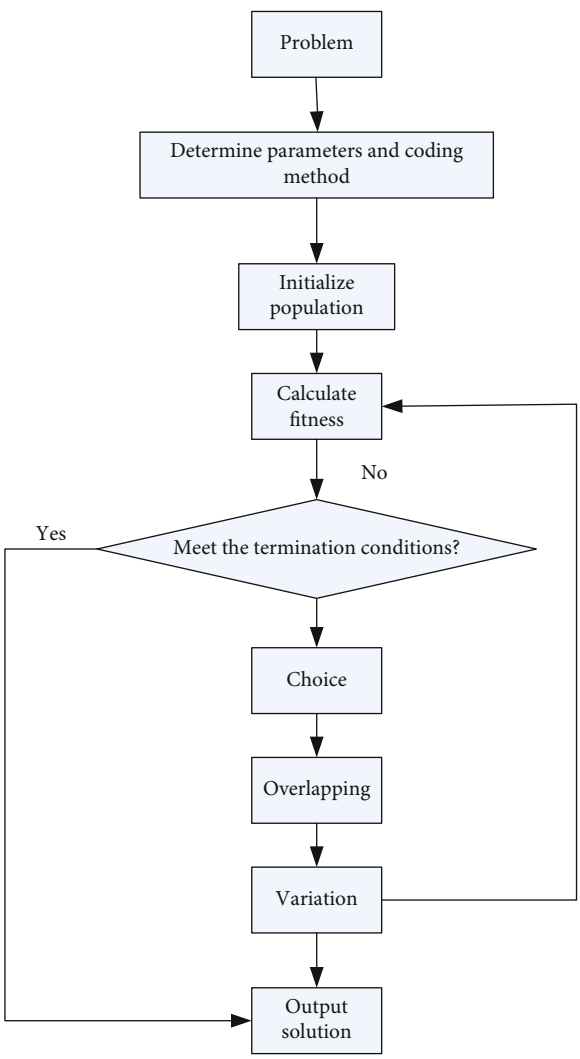

Figure 5: Genetic algorithm flowchart.

of the group in the group. E represents the operator of the selection factor, F represents the operator of crossover, G represents the mutation operator of the population, and H is the termination condition of the operation of the genetic algorithm.

(3) Relevant operation methods of the genetic algorithm

The key element in the genetic algorithm is the concatenated correlation operation between the genetic operators, and the related genetic operators are described below. The first is the calculation and analysis of the selection operator; assuming that t is the population, the final relationship is as follows:

$$n(h, t+1) = n(h, t) \cdot M \cdot \frac{f(h)}{\sum f}. \tag{17}$$

In the above formula, n is the number of individuals in the group, $f(h)/\sum f$ represents the probability of an individual being selected, and h represents a pattern. Supposing there is a fixed value a in the operation process of the genetic algorithm, then there is the following expression:

$$n(h, t+1) = n(h, 0) \cdot (1+a)^t. \tag{18}$$

In this series of process operations, the number of high-quality individuals in the group will continue to increase. The effect of the selection operator on the pattern is observed: as the iteration progresses, the number of individuals with a pattern that is better than the average fitness of the population will continue to increase. And the growth is exponential. At the same time, the growth rate is also positively related to the difference between the mode and the average fitness. In contrast, the number of individuals with inferior patterns decreased exponentially. The following is the correlation calculation for the crossover operator. When the individual with h mode undergoes the corresponding transformation, its expression is as follows:

$$P \geq 1 - P_0 \cdot \frac{\lambda(h)}{(S-1)}. \tag{19}$$

S in the above formula represents the length required for encoding, and P_0 represents the probability of the crossover algorithm. The above formula shows that the higher the fitness, the shorter the corresponding distance defined and the better the number of individuals in a mode will increase. Next is the introduction of the mutation operator. The operation of this operator will be related to the first two, and its expression is as follows:

$$n(h, t+1) \geq n(h, t) \cdot \left(\frac{f(h)}{\bar{f}}\right) \cdot \left[1 - P_0 \cdot \frac{\lambda(h)}{(S-1)}\right] \cdot [1 - P_n \cdot g(h)]. \tag{20}$$

With the deduction formulas of the above operators, it can be concluded that when the population has high adaptive performance, short defined distance, and low stratum,

the number of individuals will increase with the change of the operation mode [21].

2.3. Method of the Basketball Teaching Environment Evaluation Index. Physical education is as important to students as the learning of classroom knowledge. Combining physical education with classrooms can finally realize the simultaneous development of students' minds and bodies. This paper studies the evaluation index of basketball teaching environment. The purpose is to better realize the establishment of a series of sports activities related to basketball.

(1) Basketball teaching environment evaluation system

This paper attempts to construct a corresponding evaluation index system from the environment of a basketball teaching classroom. This is to adjust the coordination of teaching activities in the course. For the different angles of teachers and students, some influencing factors of the previous basketball teaching classroom are considered accordingly. The evaluation hierarchy of its composition is shown in Figure 6.

Figure 6 is a hierarchical diagram for the construction of a basketball teaching environment. It includes three indicators for the natural environment of the teaching classroom: the sports normative environment, the sports cultural environment, and their corresponding secondary and tertiary indicators.

(2) Questionnaire production for evaluation indicators

After establishing the corresponding evaluation index system for the evaluation indicators of the basketball teaching environment, it is necessary to collect relevant data in the form of questionnaires for the above indicators. The following is the relevant statistical data, as shown in Figure 7.

Figure 7 is a graph of data collection for a student survey of certain teaching environmental indicators. It can be seen from the figure that most of the students in the upper grades maintain a supportive attitude towards the need for some adjustments in the teaching environment. At the same time, students with higher grades also responded positively to their ability to participate in the construction of the teaching environment [22]. For the above data collection, the form of questionnaire is firstly the questionnaire of primary indicators, because the secondary indicators have been designed to the basic elements of teaching ecology and they are similar to the basic elements of classroom teaching. Therefore, it can indirectly explain the specific measures of teaching ecologicalization. Therefore, this paper mainly analyzes the relationship between the first two levels and the overall goal. It found the influence of basic elements of teaching on classroom ecological teaching, as shown in Table 2.

The results of the weight judgment in Table 2 are reasonable, and the results are relatively effective. In addition to the judgment of the mentioned first-level evaluation indicators, it is also necessary to judge the corresponding second-level evaluation indicators, and the results are shown in Table 3.

By arranging the data in Tables 2 and 3, the final relationship diagram of each indicator can be obtained, and the result is shown in Figure 8.

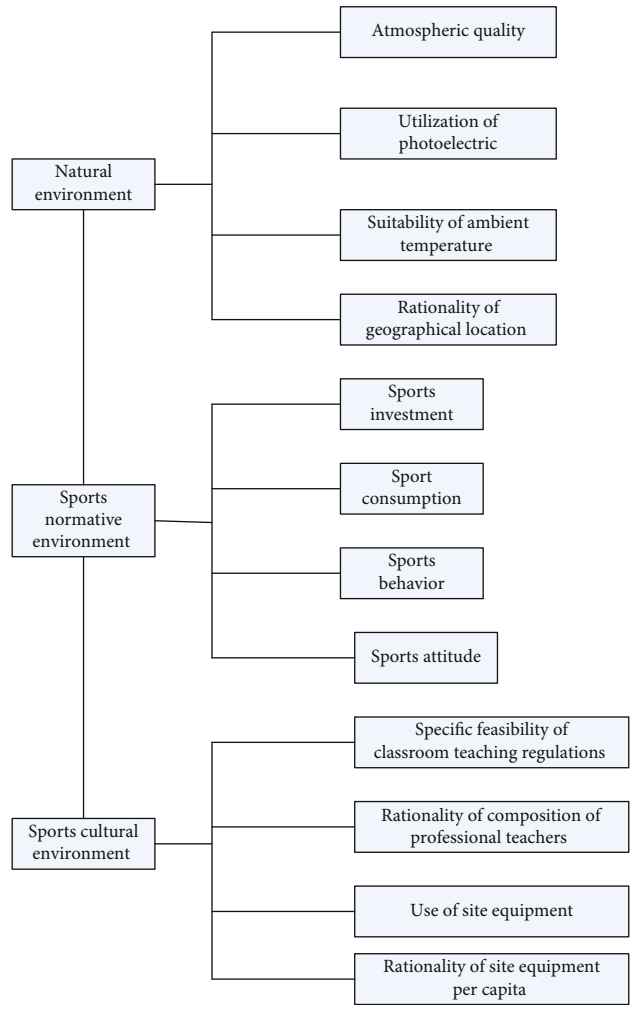

Figure 6: Framework of evaluation indicators for basketball teaching environment.

As can be seen from Figure 8, there are many human factors involved in the weighting. Therefore, the development of basketball teaching should be based on people and then adjust the teaching environment according to the different indicators of the environment.

3. Basketball Teaching Evaluation Experiment and Result under the Wireless Communication Network and Genetic Algorithm

3.1. Simulation Processing Experiment and Result of the Wireless Communication Network. The related experiment of the wireless communication network in this place is to establish the evaluation system for basketball teaching environment evaluation. For this requirement, it is necessary to improve the related establishment system of the traditional wireless communication network. Therefore, it is necessary to do simulation experiments for wireless communication networks. First of all, the parameter table that needs to be used in the simulation experiment is shown in Table 4.

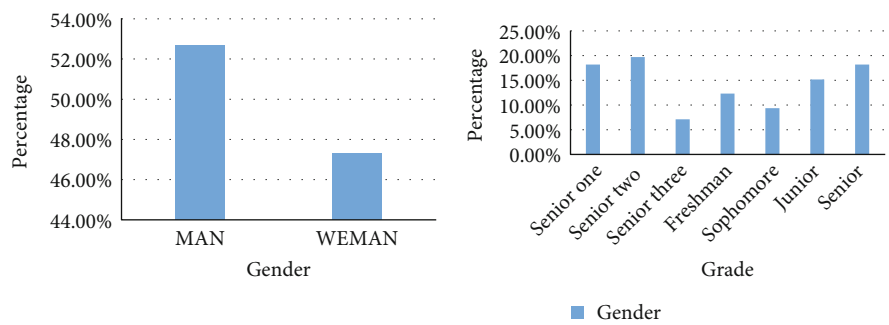

Figure 7: Survey data of students with teaching evaluation indicators.

Table 2: The first-level index matrix of basketball teaching environment evaluation.

	Teaching support environment	Classroom teaching media	Teaching human participation	Classroom evaluation
Teaching support environment	1	1/5	1/7	3
Teaching support environment	5	1	1/3	7
Teaching human participation	7	3	1	8
Classroom evaluation	1/3	1/7	1/8	1

Table 3: Matrix of secondary indicators of basketball teaching environment evaluation.

	Normative environment	Cultural environment	Content of courses	After class diagnosis
Normative environment	1	1/5	1/4	1/2
Cultural environment	5	1	3	4
Content of courses	4	1/3	1	3
After class diagnosis	2	1/4	1/3	1

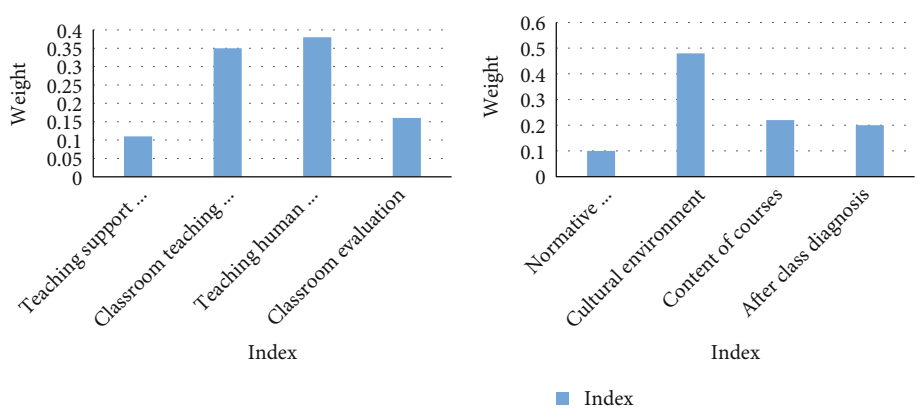

Figure 8: Weight ratio of indicators at all levels.

Table 4 is the preparation of the parameters required for the simulation experiment, and the following is the analysis of the simulation experiment results. The first is a test of the satisfaction with the communication of the wireless communication network and the number of user requests processed by the mentioned system per unit time. The result Random

Table 4: Simulation parameter table.

Simulation parameters	Set value
BS transmit power	45 dB
D2D communication versus transmit power	20 dRm
Gaussian white noise power	-55 dBm
Number of cellular users	25-60
Cell radius	250 m
Number of D2D communication pairs	5
D2D communication path loss index a	3
D2D communication link length	≤30 m
Antenna gain	16 dBi
Antenna type	Omnidirectional
RB bandwidth	4

Resource Allocation Algorithm (RANDOM) and Service Rate Demand Aware Resource Allocation Algorithm (SARA) are shown in Figure 9.

It can be seen from Figure 9(a) that the stability of the satisfaction algorithm SARA of the wireless communication network is relatively high, which indicates the satisfaction degree of the mobile terminal users for different algorithms. The η of the SARA algorithm is always equal to 1, while the η of the RANDOM algorithm decreases as N increases. Therefore, the SARA algorithm is significantly better than the RANDOM algorithm. Therefore, the SARA algorithm is used to test the satisfactory adjustment algorithm. It can be seen from Figures 9(b) and 9(c) that the SARA algorithm is relatively stable when the number of users is the same. Among them, Figure 9(b) represents the relationship between the number of users among the mobile devices and the system throughput, and Figure 9(c) represents the relationship between the wireless communication network users and the system throughput.

Next, a corresponding study should be carried out on the reduction of the number of users of the wireless communication network, and the algorithm involved is still the mentioned algorithm. The corresponding results are shown in Figure 10.

As can be seen from Figure 10, the performance of the algorithm to send SARA in reducing the number of customers for the wireless communication network will be better than that of another algorithm, because the same index of the SARA algorithm and RANDOM algorithm will increase with the increase of M, but another index of the SARA algorithm will also increase with the increase of a. It can be concluded that the SARA algorithm is better than the RANDOM algorithm. Figure 10(a) shows the relationship between the number of mobile terminal device users and the total amount of wireless communication network user rate reduction under different algorithms. Figure 10(b) shows the relationship between wireless communication network users under different algorithms and the total rate reduction of wireless communication network users.

3.2. Genetic Algorithm Experiment Simulation Experiment and Result. The application of the genetic algorithm in the evaluation of basketball teaching environment is to select the optimal evaluation index from a large number of evaluation indexes. However, when the genetic algorithm performs related operations in the evaluation index of the basketball teaching environment, different improvements are needed to adapt to the final evaluation and detection. In addition, because the evaluation system is carried out for the teaching environment of physical education, it needs to use different improved algorithms to realize it. The performance comparison of each algorithm is shown in Table 5.

From Table 5, it can be seen that the postrepair efficiency of improved NSGA-II and the variable within the unit are the highest at 99.5% and 1.13%, respectively. It can achieve better energy utilization.

3.3. Experiment and Result of Basketball Teaching Environment Evaluation Index Based on the Genetic Algorithm. The research on the evaluation index of the basketball teaching environment based on the genetic algorithm is to have a more comprehensive understanding of the influencing factors involved in the basketball teaching environment and a more prominent understanding of the important factors. Its purpose is also to better evaluate the basketball teaching environment. The evaluation index needs to be coded, and its coding table is shown in Table 6.

Table 6 is the coding definition for some relevant parts of the basketball teaching class, so as to perform corresponding algorithm operations for each part. In a genetic algorithm, the solution to an optimization problem is called an individual. It is represented as a sequence of variables, called a chromosome or gene string. Chromosomes are generally represented as simple strings or strings of numbers, although other representations are applicable depending on the particular problem. This process is called encoding. For the operation of the genetic algorithm of the evaluation index of classroom teaching, only when the standard deviation of the function value of the fitness of the evaluation index is less than 1 is the evaluation index that can best describe the classroom teaching obtained. This paper studied 164 people of different grades. The final result shows that 85.16% of the students gave a positive evaluation to this evaluation system, which shows that the index evaluation system established in this paper is effective.

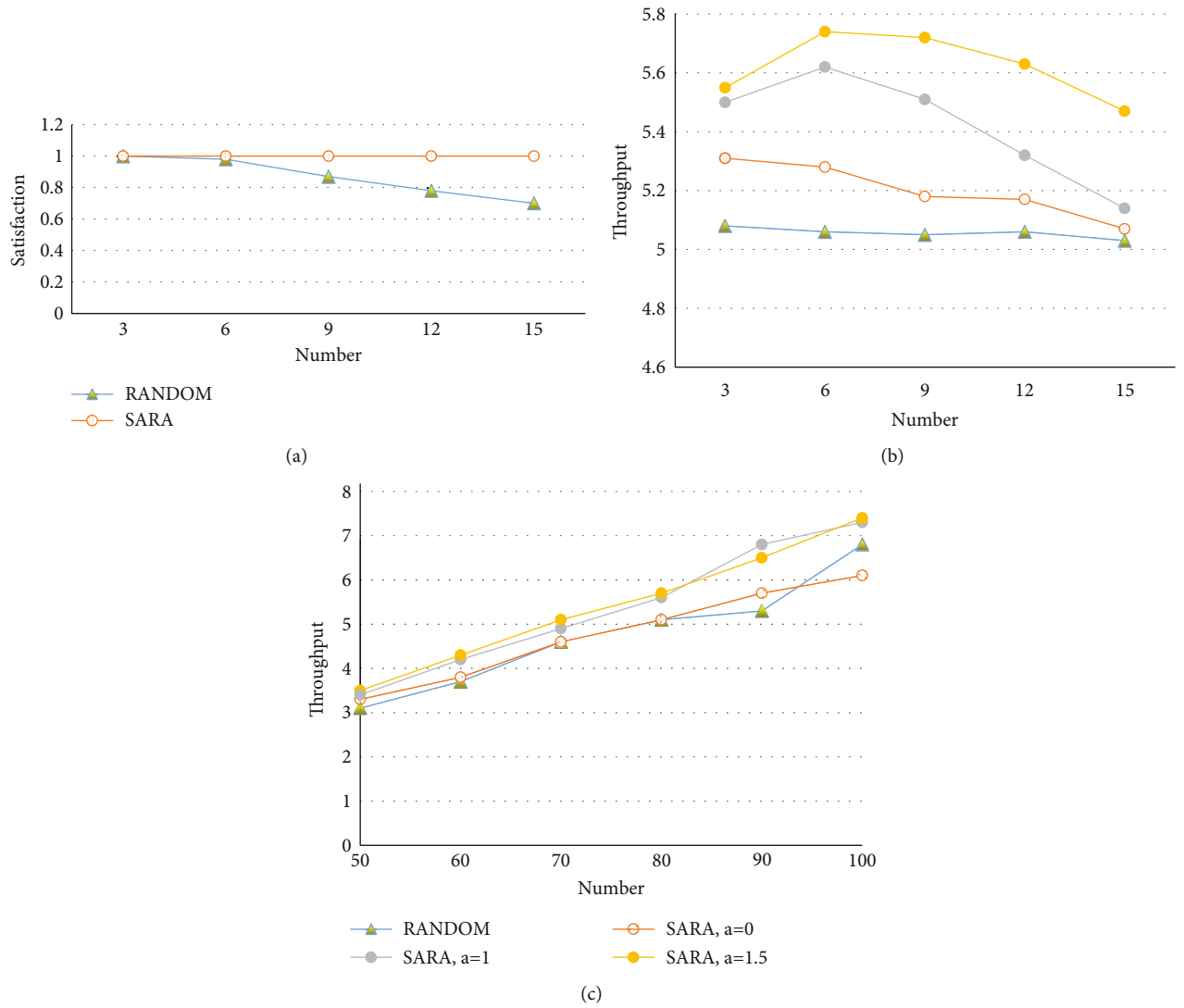

Figure 9: A graph comparing satisfaction and throughput-related algorithms.

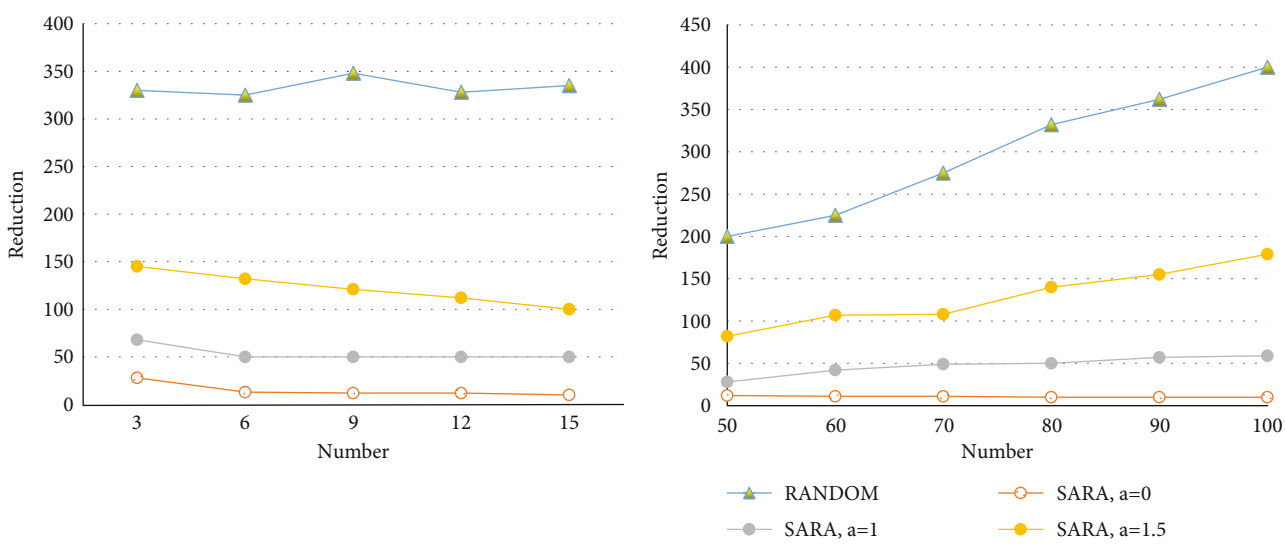

Figure 10: Comparison of algorithms for users to reduce speed.

Table 5: Performance comparison of various algorithms.

Algorithm name	Repair rate	Average value	Unit change
GA	99.1%	26	0.65%
NSGA-II	99.5%	24	0.78%
Improved NSGA-II	99.5%	15	1.13%

Table 6: Coding table.

Number	Teaching organization	Coding
1	(Null value)	0000
2	Group teaching	0001
3	Free activities for students	0010
4	Group collaboration	0011
5	Individual classes	0100
6	Autonomous observation	0101
7	Group discussion	0110

4. Discussion

It uses this to optimize the basketball teaching environment. For the relevant algorithms in the simulation experiments, in addition to the traditional use of the genetic algorithm, the genetic algorithm is also improved to some extent. It makes its operation more suitable for the use environment of this paper.

In addition to the calculation of the genetic algorithm for the evaluation index in the teaching environment, the research on the application of the wireless communication network technology to the evaluation index of the basketball teaching environment is also carried out. And the relevant simulation experiments are carried out for the research object, and the improved genetic algorithm related to the wireless communication network is also used in the experiment. It lays the groundwork for the application of the wireless communication network in basketball teaching environment.

In this paper, relevant simulation experiments are carried out for the evaluation indicators of basketball teaching environment, and the corresponding evaluation indicator system is established. The model for the optimization of the indicators established in the article can provide some support for the optimization of some aspects of the actual classroom.

5. Conclusion

This paper studies the evaluation index of basketball teaching environment and adopts the genetic algorithm. In this paper, the relevant evaluation indicators are established for the research objects in this paper. This makes the evaluation index of the basketball teaching environment to be well selected, so as to correct the teaching process of the classroom. According to the evaluation index system constructed by the genetic algorithm and wireless communication network, in the simulation experiment, for the running algorithm of the wireless communication network improved NSGA-II, the repaired efficiency and the variable within the unit are the highest, reaching 99.5% and 1.13%, respectively. It is the best result of various methods.

Data Availability

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

Conflicts of Interest

There are no potential competing interests in my paper.

Acknowledgments

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