

# Application of BP Neural Network to Optimize the Allocation of Art Teaching Resources

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Reasonable allocation of art teaching resources can improve the management efficiency of art teaching resources. There is a large delay in the allocation of art teaching resources, which leads to the long occupation time of network resource allocation channel. The traditional method of network experiment resource allocation is to assign resource tasks for different channels to complete the resource allocation. When the network resource allocation channel occupies a long time, the allocation efficiency is reduced. This paper proposes an optimal allocation method of art teaching resources based on multi rate cognition. From the point of view that there are a pair of primary users and a pair of secondary users in the network, this method constructs a resource allocation delay model, obtains the resource allocation delay under different modes, and dynamically adjusts the transmission rate on the allocation resource block. The art teaching resource allocation scheduling problem is modeled as a nonlinear optimization problem, and the constraints of the optimization problem are given, which are integrated into greedy computing. The global optimal solution of the problem is carried out by using the method, and the allocation of art teaching resources is completed. Simulation results show that the proposed algorithm greatly improves the efficiency and effect of teaching network resource allocation.

**Keywords:** BP neural network, art teaching, resource allocation, delay model

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## INTRODUCTION

As one of the main elements of basic education, art education occupies a very important position, but it is affected by the larger environmental factors, such as the rationality of the allocation of educational resources, the investment of human and financial factors in the process of education, and whether the mix proportion of material conditions is reasonable, which directly affect the development prospects of basic education<sup>1</sup>. With the increasing emphasis on education in society, the need for high-quality education resources is also growing, and there is a lot of unbalanced allocation of education resources. The imbalance of fine arts excellent education resources hinders the development of China's education, disturbs social fairness and justice to a large extent, and has adverse effects on the development of social economy, which has become

a negative element in the development of a harmonious society<sup>2</sup>. Educational resources can be regarded as a kind of quasi public goods, which are supplied by the market and government agencies, both of which are the key factors in the distribution of educational resources<sup>3</sup>. In the actual operation process of educational resources allocation in China, the government is in the leading position, while the market is in the assisting position. With the help of administrative measures, limited educational resources are allocated among various types of education, educational arts and educational schools<sup>4</sup>. Especially in the allocation of art education resources, the phenomenon of government leading the allocation of education resources is more prominent.

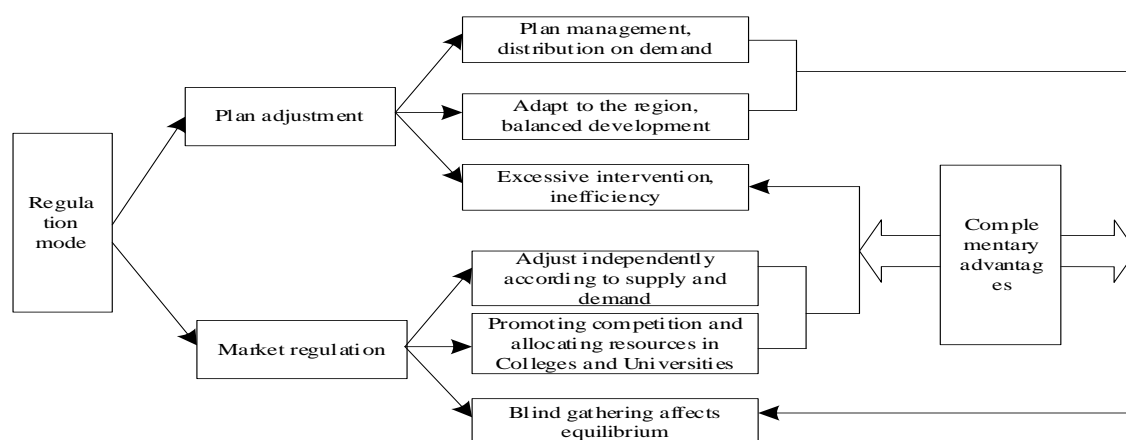
## OPTIMAL ALLOCATION OF ART TEACHING RESOURCES

### Art Teaching Resource Adjustment Model

Since the reform and opening up, China's economy has developed rapidly, especially in the new century, more and more ordinary people are aware of the important role of knowledge, and more and more Chinese ordinary families continue to increase the investment in children's education, hoping that children can share better and more comprehensive education resources, and then bring about the total expenditure of the whole society in education resources Rapid expansion<sup>5</sup>. In order to meet the demand of social education resources consumption, the government, as the main body of education resources allocation, must increase the investment of education resources. Through the integration of education resources, it can better narrow the gap between schools. The market regulation can give full play to the enthusiasm of the development of basic art education and realize the efficient allocation of educational resources. However, market regulation is blind, so under the socialist conditions, we must strengthen the function of planned regulation<sup>6</sup>. Planned adjustment refers to the prior, conscious and planned leadership and management of educational

resources according to the needs of social, economic and political development in a certain period, so that educational resources can be reasonably allocated to all kinds of educational subjects at all levels according to the proportion of objective needs, so that educational development can meet the needs of aesthetic development. However, a single plan adjustment sometimes leads to inefficiency. Due to cognitive bias, there may be insufficient or excessive intervention in the development of education, which will affect the normal development of education<sup>7</sup>. Therefore, the planned adjustment of educational resources must be based on the conscious basis and the law of using value, that is to say, the planned adjustment should also consciously use the market mechanism. The plan adjustment must be based on the guiding plan, supplemented by the necessary adjustment policy and adjustment lever<sup>8</sup>. When regulating the resources of basic art education, we should pay attention to the rational use of plan regulation and market regulation, make up for the shortcomings of single regulation, complement each other, and promote the healthy development of education as a whole. Based on this, this paper first constructs the model of plan adjustment and market adjustment of art education resources (Figure 1).

Figure 1.  
Adjustment model of art education resource plan



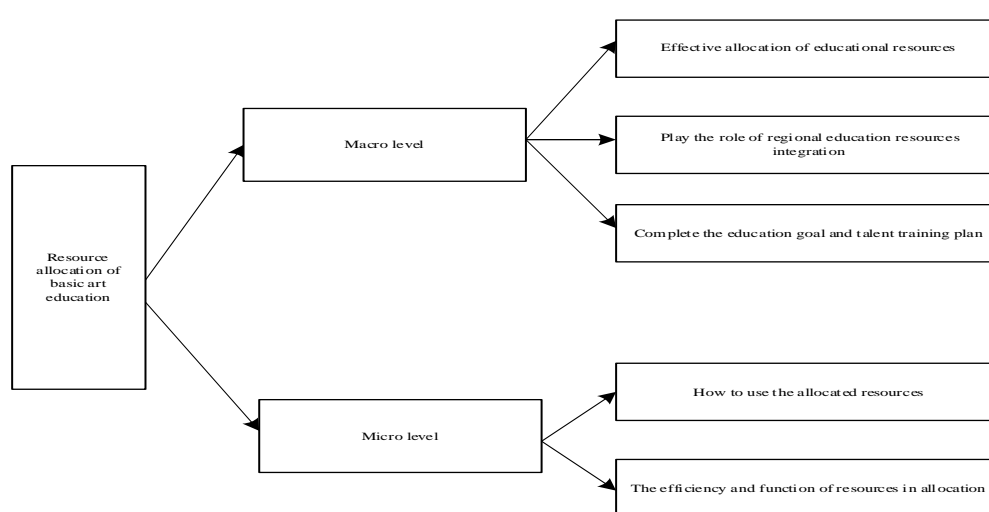
In essence, the regulation of art education resources is the rational use and scientific allocation of art education resources. According to the regulation range and scale, the regulation of art

education resources can be divided into macro level and micro level<sup>9</sup>. The macro level is mainly to solve the problem of how to effectively allocate the educational resources to the most appropriate use, and allocate the educational resources to different

educational systems, different educational management departments, different educational levels and different educational subjects, so as to maximize the integration effect of regional educational resources at the overall level of the region and complete the regional educational objectives and personnel training tasks<sup>10</sup>. The micro level refers to the specific education system, education subject, or education management

department how to use their own allocation of resources after the allocation of education resources according to the established resource allocation plan<sup>11</sup>. The goal of educational resources regulation at the micro level is to make resource owners use and allocate resources scientifically and effectively, so that they can play their due or maximum role (Figure 2).

**Figure 2.**  
**The configuration structure of art education resources**

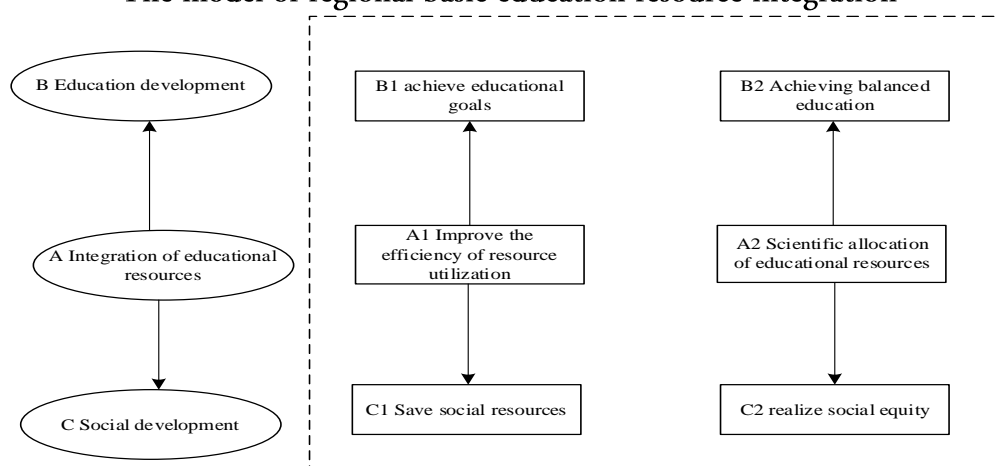


The B / S mode based on Web improves the defect of two-tier structure. B / S mode is a new information management system platform mode based on Web technology. The traditional C / S mode decomposes the data server into one or more application services to form a three-tier client server architecture. In recent years, web technology based on Intranet is widely used as TCP / IP protocol. As the core of school network, it attracts more and more schools to use it. Low cost, easy to use client browser at any time along with the school website to obtain the data they need to model. In view of the discipline with strong teachers, we should make a targeted education resource tilt, so that the discipline can be better developed, until the formation of its own unique set of teaching methods<sup>12</sup>. Through a comprehensive survey of

different factors affecting the discipline, according to the data obtained from the survey, the school carries out effective resource integration to form the personalized configuration of the school. The introduction of advanced information technology into modern education will play an important role in promoting the exchange and sharing of limited educational resources, the effective balance of the allocation of educational resources among regions, and the maximization of the effectiveness of educational resources<sup>13</sup>. The macro and micro levels constitute a complete allocation system of fine arts education resources regulation. They have both connections and differences. They interact with each other and affect the effectiveness and results of education resources regulation (Figure 3).

Figure 3.

## The model of regional basic education resource integration



Based on the above steps, increasing the allocation of educational resources is conducive to the investment of educational facilities, so as to introduce a variety of multimedia resources, such as pictures, sound, video, etc. these multimedia resources can transform abstract words into exquisite and vivid materials, thus bringing more shocking auditory and visual enjoyment to the educated<sup>14</sup>. The introduction of excellent educational resources from other schools into teaching can fully stimulate students' thirst for knowledge and release students' interest to the greatest extent, so as to continuously improve students' initiative and enthusiasm in learning<sup>15</sup>. As one of the quasi public goods, the effective allocation of educational resources is to enable the educated to enjoy the limited educational resources fairly, and then make the educational resources produce the best economic and social benefits, and further promote the rapid and good development of China's education in the right direction.

The system should provide a media resource management platform with convenient operation and friendly user interface. The system administrator can operate the resource platform of the system, such as adding, deleting, editing and uploading resource files and other general businesses, and can upload some types of common files in batches. Before the function of student status management system is put into use, the network teaching system should provide built-in delete user management function, including user

add, modify and so on. At the same time, online registration and authentication should be provided for end users. Permission management is also a resource library, whether the application can meet the standards of different applications. In order to meet the resource needs of different media about confidentiality, copyright and other requirements, the system should have the power of division and management, and control the shared resources in the network through user rights. The purpose of the resource library is to share and manage the multimedia network, and has flexible user interaction function, which is convenient for users to comment through the system platform, so as to get the latest feedback information of users.

As a kind of quasi public goods, whether all the educated can enjoy the educational resources fairly and reasonably has become an important manifestation of social equity. The allocation of art education resources should first follow the principle of equality, so that every educatee can equally enjoy education resources<sup>16</sup>. But in the real society, it is impossible to achieve absolute fairness. It can only be said that it is a relatively fair way to ensure that every educatee can share limited educational resources as fairly as possible through relatively reasonable educational resource allocation measures. The expectation of the educated groups to educational resources is different: different types of educational forms have different expectations of educational resources, and different regions have different expectations of educational resources<sup>17</sup>.

These differences inevitably require our government and market to take into account the different expectations of the educated when allocating educational resources. In the actual operation process, we should comprehensively balance the different needs of each educated group, each type of education form and each region, and formulate reasonable distribution strategies according to the local system propaganda. In addition, we should also take into account the differences of individual choices of the educated, so that the talents and characteristics of the educated can be fully played.

### The Algorithm of Resource Allocation in Art Teaching

The principle of distribution of art teaching resources is the basic criterion for carrying out the educational and teaching evaluation activities, the basic guarantee for the smooth development of educational and teaching activities, the recognition and mastery of the law of educational teaching evaluation activities and the unity of objective and practical education and teaching activities. The evaluation activities of education and teaching cannot deviate from its basic starting direction and basic objectives<sup>18</sup>. It is necessary to formulate the evaluation plan according to the development objectives, policies and policies of education and related laws and regulations formulated by the state. If the basic principles of education and teaching are violated, the educational evaluation activities will not be meaningful, and it is only unrealistic and futile<sup>19</sup>. As a kind of decision-making form of quality and disadvantage, the evaluation results will have great influence on the evaluation objects. In the planning of educational teaching evaluation plan, selecting evaluation indexes, formulating evaluation standard system, organizing educational teaching evaluation, statistical analysis and evaluation data, we must strictly abide by the scientific principles and formulate scientific and reasonable evaluation plans, scientific evaluation results are obtained. The feasibility principle of educational teaching evaluation requires that the educational teaching evaluation activities operate and operate on the premise of being realistic. When

planning and formulating the evaluation plan, it is necessary to consider whether the evaluation plan can be carried out smoothly

The main purpose of educational teaching evaluation is to promote the evaluation object to find the existing problems and deficiencies through the evaluation of the teaching process. It can improve the quality and benefit of education by making up for the defects, and play a role in promoting and guiding the modern education and teaching. The principle of promoting requires that the whole process of educational teaching evaluation must be based on the continuous improvement and promotion of the evaluation object<sup>20,21</sup>. The cooperative principle of educational teaching evaluation requires that the evaluators and the evaluation objects cooperate with each other. This is an important guarantee for the smooth development of educational evaluation activities. This is also a reflection of the characteristics of modern education evaluation. In the process of allocating network resources, the author first proposes the request for network resource allocation, and the search engine searches in interne and network resource information base, Get the sorting of resources and their optimization parameters, obtain the list of high-quality network resources, and promote the optimized network resource information to submit to the distribution user in the form of paging. The specific steps are as follows: assuming that  $a$  represents the linear combination of local resource vectors by  $A$  representing  $n$  data block contents of original resources, and  $f$  represents the resource allocation request, the resource allocation request is obtained by formula (1) to obtain the network resource ranking and its optimization parameters:

$$S_D(i, j) = \frac{F(dx_k)}{C_{ij} \times A_n} R_M \times P_s \quad (1)$$

In the formula,  $F(dx_k)$  is the channel gain,  $R_M$  is the resource requesting node,  $P_s$  is the unit power, satisfying the condition of  $j=1,2,3,\dots,n$ . Assuming that  $C_{ij}$  represents the list of network resources,  $A_n$  represents the processor set of resources and represents the resource service capability, then the average delay of resource

allocation is calculated by using the formula:

$$d_s = \delta(r, j) \times \frac{l_2}{r} \quad (2)$$

In the formula,  $\delta(r, j)$  represents the average service time of network users, the maximum total transmission power of terminals, and the current working state of art teaching resources. Assuming that  $x_i$  represents the allocation cost function of single resource and  $h(\tau, \kappa)$  represents the total allocation cost of all network resources, the above formula is used to optimize the network resource list to obtain a high-quality network resource list:

$$\sigma(o, p) = \frac{x_i}{h(\tau, \kappa)} S_D(i, j) \times H_h \quad (3)$$

In the formula,  $H_h$  represents the order of network resources. Assuming that the network environment is represented by the user node, the network resource allocation can be completed by using equation:

$$ck(j) = \frac{\sigma(o, p) \times k_l}{G + f(y, k)} \quad (4)$$

In the formula,  $G$  represents the idle downlink power resource  $k_l$  represents the channel gain, and  $f(y, k)$  represents the Gaussian white noise power. The above method can explain the principle of network resource allocation, and the method can effectively complete the network resource allocation. There is a large delay in the allocation of art teaching resources, which leads to the long occupation time of network resource allocation channel. The traditional method of network experiment resource allocation is to assign resource tasks for different channels to complete the resource allocation. The long occupation time of network resource allocation channel reduces the allocation efficiency. This paper proposes an optimal allocation method of art teaching resources based on multi rate cognition. In the process of art teaching resource allocation, a resource allocation delay model is established from the perspective of a pair of primary users and a pair of secondary users in the network to obtain the user delay in different modes. Considering the assumption that there are a pair of primary users and a pair of secondary users in the network, in 2A, the Poisson distribution of

primary user and secondary user resources obeys the parameter,  $L_p$  and  $l$  represent the corresponding packet length,  $p_u$  represents the sending node of primary user, PUD represents the receiving node of primary user,  $R_p$  and  $R_n$  represent the channel rate of secondary user sending resource node SUs respectively,  $R_s$  represents the channel rate of secondary user sending resource node SUs to primary user receiving node PU and secondary user receiving resource node SUD. If the secondary user participates in the resource allocation process to the primary user, if the primary user resource node is grouped with the secondary user, the equivalent packet transmission rate of the primary user after allocation represented by  $R$  is calculated by the following formula:

$$R_{CP} = \frac{pU_s + pU_D}{SU_s(R_s + SU_D)} \times R_{SP} \quad (5)$$

Based on the above analysis, the resource allocation delay model is constructed by using the following formula:

$$q(R_{CP}) = \frac{SU_s \times R_{PS}}{R_{SP}} SU_D \quad (6)$$

In the non allocation mode of resource use, the primary user has the priority to use the resource. When the primary user no longer uses the resource, the secondary user can use the resource. When the primary user needs to use the resource, the secondary user should give up the right to use the resource to the primary user in time. Then the average resource use delay of the primary user is established by using the following formula:

$$E_{NC} = E[X_{NC-P}] + \frac{\lambda_p E(X_{NC-P}^2)}{2(1 - \rho_{NC-P})} \quad (7)$$

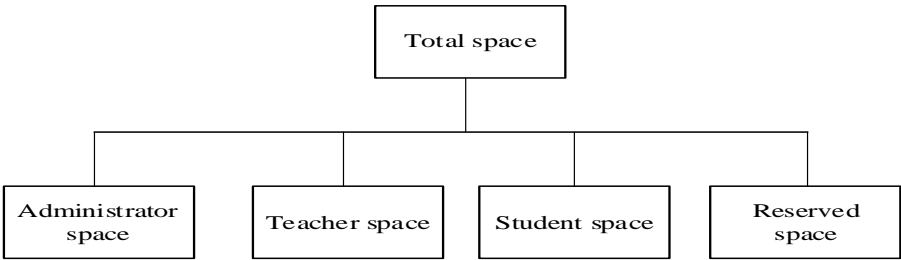
In the formula,  $E$  represents the average service time of the primary user in the non allocation mode,  $X_{NC-P}$  represents the resource utilization rate of the primary user, and  $P$  represents the ratio of the resource utilization rate of the primary user to the departure rate of the primary user in the non allocation mode.

**The Realization of the Optimal Allocation of Art Teaching Resources**

The development and utilization of art teaching resources system is of great significance to the transformation of learning methods. On the one hand, it can guide students to change from passive knowledge acceptors to knowledge co constructors, changing the status of students in art learning. On the other hand, it can broaden the vision of art teachers and stimulate their creative wisdom. At the same time, to optimize teaching and improve the quality of teaching, to carry out autonomous learning, to break through the limitations of time and space, to achieve resource sharing, to solve the contradiction between limited teaching and unlimited educational needs, to solve the rapid renewal of knowledge, to improve the transfer rate of knowledge, but also to change the mode of human brain processing information. The analysis of the data and results obtained from the investigation of the current situation of the distribution of classroom teaching resources can only be calculated as the quantification of the surface problems in the distribution process, only reflecting the tip of the iceberg in the process of distribution, and the deeper distribution contradiction is far from obvious. The factors that affect the fair distribution of resources begin to appear slowly, which is the key step to solve the problem. The meaning of fair distribution of educational resources lies in the realization of on-demand distribution. However, the reality is

that as a scarce resource, the imbalance of distribution will inevitably occur in the process of distribution. However, the scarcity of resources does not mean its irreplaceable. The development and utilization of alternative resources will also alleviate the shortage of resources, and benefit more students, so as to provide guarantee for fair distribution. What resources can be used in the classroom? How to allocate these resources? How to develop potential resources and other teachers' resource consciousness is weak. This weak consciousness refers to teachers' ability of resource development and allocation that teachers do not realize or consciously cultivate their own resources development and allocation ability in classroom teaching. Here, we emphasize two aspects of the problem: the ability to develop new resources and the ability to allocate existing resources. The users of the online teaching platform are divided into four categories: students, teachers, administrators and visitors. For visitors, I do not allocate space and only provide the right to browse open courses, Therefore, the system can be divided into categories: administrator space (providing announcement and distribution resources, etc.), teacher space (storing curriculum resources, etc.), student space (storing their own network homework, collected teaching resources, etc.), reserved space (for the administrator to allocate to temporarily added teachers or students, etc.), and the system space model is described as follows (Figure 4):

**Figure 4.**  
**Space classification of teaching platform**



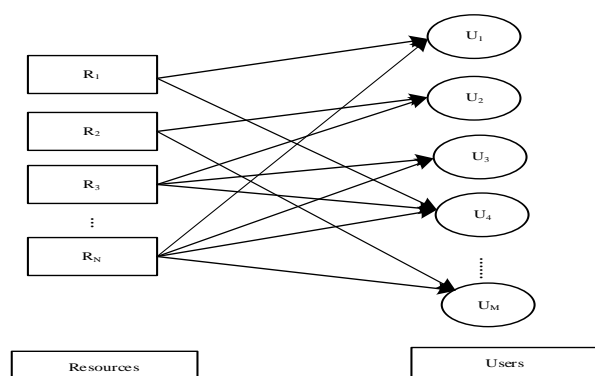
In the treatment of students, we are always used to give a lot of high-quality teaching resources to excellent students, so that they can get priority development, for fear that a little neglect will hurt

their confidence in learning or academic performance. For students who do not study well, teachers think that even if they give more resources, they will waste them, No matter what happens, the

result is the Matthew effect in education. In fact, the excellent achievement of eugenics is not only due to a lot of resources invested by teachers, but also due to the formation of good learning quality. Therefore, the academic performance of eugenics will not decline because of a little less resources. If teachers attribute their excellent performance to their attention to students and the investment of resources, it will be a waste of resources. In the allocation of student space, a series of parameters are used to evaluate students, so as to promote students to use the teaching platform more and master more knowledge. Because of the similar ideas of teacher space distribution, this paper takes teacher space as an example to describe how to allocate teacher space effectively. The system space allocation model for student space is also described as follows (Figure 5):

Figure 5.

#### Art teaching resource allocation model

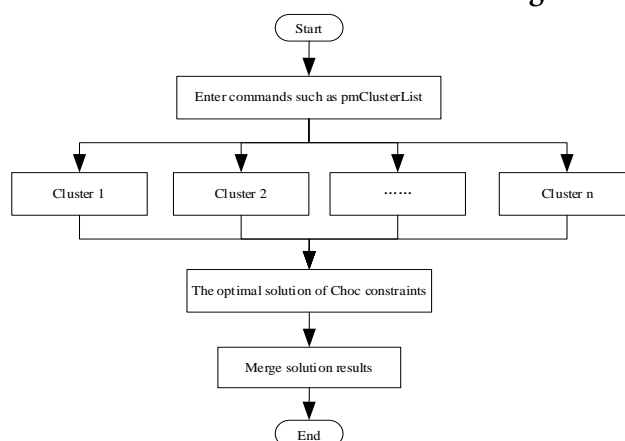


After the installation and operation of multimedia art teaching resource management system, it can well realize the sharing of network art teaching resources. The multimedia art teaching resource system is composed of multimedia system and multimedia beauty resource system, while the information resource system is composed of textbook library and material library. The material realizes the multi-media elements, and the newly uploaded material needs to be stored in the material library first. In addition, multimedia video material provides video on demand function, users can easily play video material online. In the process of resource allocation, the more realistic vector values are first input to the virtual machine for the next calculation. The advantage of this strategy is

that it can quickly find the most realistic allocation method. In order to establish a more perfect distributed scheduling model, in addition to the above two basic algorithms as a guarantee, we need to establish a section for virtual machine to implement This algorithm can only be executed by a specific virtual machine. In other words, this code is executable for a specific virtual machine, and it is wrong in any other situation. Through the establishment of pseudo code, the singleness and security of the whole distributed scheduling model are greatly improved. The specific operation process is shown in Figure 6:

Figure 6.

#### Workflow of distributed scheduling model



Multimedia art teaching resource management system consists of database server, web server, on-demand server and video subsystem of material / material server. In addition, the VOD server can be set up on the same server only according to the actual situation of other services, so as to reduce the hardware investment. Multimedia art teaching resource management system in the multimedia information system layer, the relationship between the system construction needs to pay attention to the following aspects:

1. The system provides remote access to the network, users can access all the material resources of the system anytime and anywhere.
2. Have good information system structure to provide standard and safe interface for application program.
3. Considering the growth of system resources and large amount of stored data, the system must support decentralized data management.



Through the construction of the above algorithm and the operation of pseudo code, the construction of the proposed distributed scheduling model is completed. However, the model is still in the early stage of development, so it will further improve each link in the future use process, so as to better guarantee the effect of art teaching resource allocation.

## ANALYSIS OF EXPERIMENTAL RESULTS

In order to prove the effectiveness of the method of optimizing the distribution of art teaching resources by BP neural network, an experiment is needed. The experimental data are taken from the website of experimental teaching resource allocation information in a university city, and an experimental platform for the distribution of art teaching resources is built in MATLAB software environment. In order to prove the effectiveness of this method, an experiment is needed. The experimental data is taken from the experimental teaching resource allocation information website of a university town, and the experimental platform of art teaching resource allocation is built in the MATLAB software environment. The development platform mainly includes database development tools, HTML development tools and dynamic web development tools. Mainly use the following software: Dreamweaver, flash, Java, JavaScript, Dreamweaver, VBScript, ASP, etc. The operating system is used to manage the main hardware resources of the server, generally using Windows NT / 2000 server: as the operating system, according to their own technical strength can also choose UNIX, Linux, etc.; when using raid, double-click hot backup hardware configuration, need the corresponding auxiliary tool software to drive and manage. Management software mainly includes database management system, WWW service software. For Windows NT / 2000 server operating system, SQL 2000 server and web service software iis6.0 are used in database management system. The database management system of unix system adopts Oracle and Apache as the web publishing service software (Table 1).

Table 1.

### Experimental parameters

Parameter	Numerical value
Number of computers	15 sets
Manager memory	2.1-3.5 GHz
Storage database	SQL server
The server	Dual disk array
Communication rate	120-150Mbps

Through the proposed algorithm and the proposed improved algorithm, the allocation of art teaching resources is simulated. Compare the transmission efficiency and throughput of two different algorithms in resource allocation. The comparison results are shown in the Figure 7 and Figure 8.

Figure. 7

### The allocation efficiency of art teaching resources with different algorithms

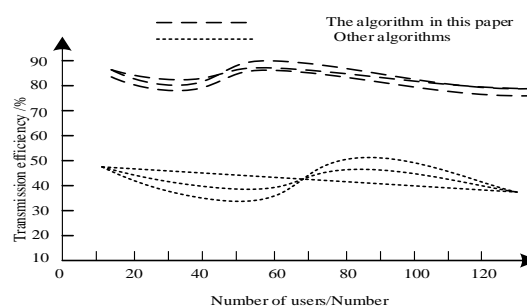
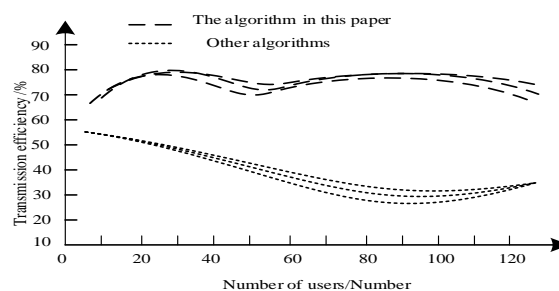


Figure 8.

### Throughput comparison of different resource allocation algorithms

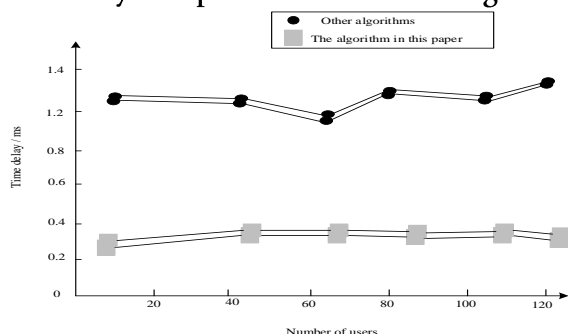


It can be concluded from the analysis in the figure that the network transmission efficiency and throughput of art teaching resource allocation by using the algorithm is better than that by using the traditional method. This is mainly because when

using the algorithm to allocate art teaching resources, from the point of view that there are a pair of resource primary users and a pair of resource secondary users in the network, the resource allocation delay model is established to obtain the resource allocation delay under different modes. So as to ensure the network transmission efficiency and throughput of the algorithm for art teaching resource allocation, the experiment of art teaching resource allocation is carried out by using algorithm and traditional method respectively. Compare the resource allocation delay (MS) and resource utilization (%) of the two algorithms. The comparison results are shown in Figure 9.

Figure 9.

Time delay comparison of different algorithms



It can be concluded from the analysis of the figure that the comprehensive effectiveness of using the algorithm to allocate art teaching resources is better than that of using the traditional method. This is mainly because when using the algorithm to allocate art teaching resources, the transmission rate on the allocation resource block is dynamically adjusted, and the allocation and scheduling problem of art teaching resources is modeled as a nonlinear optimization problem. So as to ensure the comprehensive effectiveness of the algorithm for the allocation of art teaching resources. Simulation results show that the proposed algorithm greatly improves the efficiency of art teaching resource allocation.

## CONCLUSIONS

Resource optimization is an important measure of teaching reform. As far as the optimal allocation of educational resources is concerned, it is also an

important topic, which is related to the better development of compulsory education in primary and secondary schools. Therefore, it is particularly important to do a good job in this research. At the beginning of the research on how to allocate the resources of compulsory education in our country at the present stage, this paper analyzes the allocation of various educational resources in different regions, and then makes a specific analysis and Research on the uneven distribution of educational resources investment, and finally puts forward some suggestions on this aspect. However, limited by personal learning and limited to the accuracy of some data, it is difficult to make a complete and systematic research on the allocation of educational resources from a single aspect. Therefore, it is inevitable that there will be some one-sided and imperfect aspects, which need more efforts. It is also hoped that more researchers can make research on compulsory education.

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