Grid Architecture and Metadata Model of Computer Education Resources Based on Network Teaching Mode

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Abstract. With the continuous progress of our modern science and information technology, network computer distance teaching has gradually become an indispensable part of our school education. In view of the major shortcomings of the current network physical education teaching system, such as the isolation of information resources and the difficulty of updating, the comprehensive research and application of network education information grid management technology and education metadata processing model are established. In the research and analysis, this paper selects 235 network teaching model involved in the sample survey, and through the survey of network teaching mode and traditional teaching mode multimedia, non-linear, independent comparative analysis, from the comparative results show that the network teaching mode is superior to the traditional teaching mode, not only can promote the development of computer teaching mode, but also can improve computer teaching effect. Through the investigation, it is found that both teachers and students have more than 85% recognition of the network teaching mode, which provides a guarantee for the network teaching mode.

Keywords: Network Teaching, Computer Education, Grid System, Metadata Model

1. Introduction
Computer network technology is an indispensable part of today's society, network teaching is the new development of computer education. As a new education mode, network teaching mode plays a key role in computer education, which can effectively integrate resources and realize the optimal allocation of resources [1-3]. However, there are still some problems in the process of rapid development. Only by exploring effective countermeasures can we better promote the reform of computer education under the network teaching mode. With the development of education informatization, there is a huge complex, loose distribution of network education resources, such as the difficulty of searching and sharing of educational information resources management. As an infrastructure for the integration of geographically dispersed grid resources, it provides a good opportunity to solve the above problems [4-5].

Education resources in a broad sense include learning objects, student status management, teaching materials and other related information, while education resources in a narrow sense include teaching
courseware, examination questions, teaching objects, etc. There are a variety of dynamic education resources in the grid environment, which are geographically dispersed and can be dynamically joined or left different regional management organizations [6-8]. How to make grid applications use various resources more easily is a problem that must be solved. Due to the numerous standards of educational informatization, many different grid applications need to acquire and share the same resource metadata [9-10]. Therefore, in order to realize the sharing of educational resources in grid environment, it is necessary to use general syntax to describe educational resources and establish corresponding models, so as to facilitate the management of resource metadata in grid.

This paper analyzes the actual situation of the grid architecture of computer education resources under the network teaching mode, and points out that there are still some deficiencies in the grid architecture of computer education resources. In this paper, based on the network teaching mode of computer education resources grid architecture and metadata model research. In the research of computer education resource grid system, according to the actual situation of network teaching mode, the teaching needs are integrated to guide the construction of computer education resource grid system. Through the investigation and analysis of various data of computer education resource grid system, this paper believes that the use of network teaching mode can promote the development of computer education resource grid architecture and metadata model, and help to improve the effect of computer teaching.

2. Development of Network Teaching and the Basic Characteristics of Metadata

2.1 Development of Network Teaching

Entering the information society, the Internet has been widely used. Network has changed the way of human learning. With its advantages of open information sharing and cross space communication, network has become the main way for learners to acquire knowledge. In this environment, network teaching came into being. It breaks the traditional concept of classroom teaching, gives full play to the advantages of network technology, and makes teaching get rid of the limitation of time and space. Network teaching focuses on the main role of learners and learning process, which is a good way to cultivate talents in the information society. At present, with the comprehensive support of national technology and funds, network teaching presents a trend of vigorous development. With the progress of science and technology, network teaching is constantly injected with new elements. With its powerful resources and technical advantages, network teaching has become an important form of personnel training in the new era.

2.2 Basic Characteristics of Metadata

Metadata is the data used to describe the data. It vividly describes the information in the form of a structured summary. The summary information is used by special researchers to reflect the content data, the state of the data and how to obtain the data, and some users need to know urgently. A large number of heterogeneous information resources are distributed on the Internet. With the increasing number of resources, it is necessary to describe the metadata of network resources, and on this basis, establish metadata standards to describe the attribute characteristics of various resources in various aspects, so as to facilitate users to obtain the required resource attribute information.

According to the research direction of this paper, the introduction of a large number of learning resources and learning resources metadata in heterogeneous grid can not only better locate the resources and descriptions in the grid, but also improve the search efficiency of users. In addition to constantly improving the corresponding data storage standards, it can also make a more unified and efficient data storage method. Through the extensive use of metadata, the efficient integration of distributed resources is realized, and the heterogeneity of different types of digital resources is shielded.
3. Investigation and Analysis on the Application of Network Teaching Mode in Computer Education Resource Grid System

Network has rich teaching resources. Making full use of the teaching resources in the network is a teaching method based on the network. The network teaching is very advantageous, can carry on the study anytime and anywhere, but also may carry on the study vividly, simultaneously also is advantageous to the student independent study ability enhancement. Network teaching is easy to concentrate teaching. According to different teaching tasks, centralized teaching is made up of teaching staff with higher professional level, and the teaching task is carried out according to the actual situation of students; while paying attention to the teaching content, it is also necessary to carry out a detailed analysis of teaching, which is both comprehensive and focused.

In the research and analysis, this paper uses two ways to conduct research, namely, questionnaire and on-the-spot interview. 235 subjects involved in the network teaching mode were selected as the survey samples. In the process of the survey, this paper found that both teachers and students of the network teaching mode, the recognition of the network teaching mode reached more than 90%. In this survey, we divided all the subjects into two groups by category. One group is a computer teaching teacher, the other group is a computer student. The comprehensive situation of computer education under the network teaching mode is analyzed. The results are shown in Table I. Based on the survey results of the two groups, the application of network teaching mode improves the grid system of computer education resources and plays an important role in the development of computer education.

Table 1 Investigation and analysis of the application of network teaching mode in the grid system of computer education resources

| Investigation items                      | Computer teaching teacher (%) | Computer science students (%) |
|-----------------------------------------|------------------------------|------------------------------|
| It has a promoting effect               | 93                           | 91                           |
| No promoting effect                     | 2                            | 3                            |
| It doesn't work                         | 5                            | 6                            |
| It is suggested to expand the scope of network teaching | 96                           | 95                           |

4. Discussion

4.1 Computer Teaching Reform Strategy Under Network Teaching Mode

(1) It realizes the leading role of the majority of students. In China's traditional classroom teaching mode, teachers always occupy an absolute dominant position in classroom teaching. Most of the classroom teaching preparation time is directly occupied by teachers, so they directly dominate the whole classroom teaching direction. Compared with other traditional classroom teaching mode, online classroom teaching emphasizes how to promote the development of students' subjective thinking ability. Teachers should actively encourage students to actively participate in network teaching and become students' main body of network teaching.

(2) Teachers should guide learning. In the reform of Internet information teaching, teachers not only need to improve the shortcomings of traditional teaching, but also can optimize teaching by using information technology according to students' problems. From the current situation of using information technology for reform, network teaching not only has a better classroom atmosphere, but also can stimulate students' curiosity of learning to the greatest extent, so that they can participate in learning more actively.

(3) Continue to strengthen social practice teaching. The international application of information network technology in the management of experimental teaching in Colleges and universities is organically integrated, which can directly use international network sharing to realize the organic combination of scientific production and experimental education, and the integration of science and
experimental education management. Through education, the experimental teaching management mechanism based on experimental teaching management is constructed to promote the effective practice of education development and experimental personnel training. According to the analysis of the development goal of sports talents training and the national strategy of sports development in recent years, computer science and network information technology have played a positive role in promoting the reform of practical teaching in experimental schools, providing more information teaching resources for promoting the reform of practical physical education in experimental schools. Therefore, from the perspective of the application of practical technology, it is very important to expand the students' knowledge in the field of professional practice technology.

Figure 1 shows a comparative analysis of teachers' and students' satisfaction with computer teaching reform. In order to further analyze and compare the advantages of network teaching mode and traditional teaching mode, the results are shown in Figure 2. As can be seen from Figure 2, the multimedia, non-linear and autonomous teaching mode is obviously superior to the traditional teaching mode. The traditional teaching mode involves a small scope, a single teaching method, and the efficiency is not ideal. After the promotion and use of network teaching mode, the teaching efficiency is improved, and the teaching effect is also significantly improved. Through investigation and analysis, it is shown that the advantages of network teaching mode are greater than the disadvantages in the application of computer teaching. It is very important to popularize the network teaching mode in order to achieve good results in computer teaching.

Fig.1 Comparative analysis of teachers' and students' satisfaction with computer teaching reform

Fig.2 Comparative analysis of multimedia, non-linear and independent teaching mode between network teaching mode and traditional teaching mode
4.2 Grid Technology and Educational Resource Metadata Model

(1) Grid technology

Power grid is based on the concept of power grid. The ultimate goal of grid is that users do not need to know which computer their computing power and shared resources come from when they use the grid. Grid, also known as grid computing, is to integrate the whole Internet into a huge supercomputer to realize the comprehensive sharing of computing resources, storage resources, knowledge resources, expert resources, etc.

Core idea of grid is "the network is the computer", and its basic characteristics are: the first kind of distribution and resource sharing: distribution is the characteristics of the most primitive grid, the completion of computing grid is through the centralization and decentralization of resources, and resource sharing is a means of resource concentration. The second way is a high degree of abstraction: all the computer capabilities and all the resources using the computer are highly abstracted as a "power board" visible to all users, and everything else is transparent to all users. The third is the similarity of nature, that is, there are the same or similar mathematical laws between two large scale and small mass scale. The fourth is the technology dynamic and demand diversity: like the traditional power grid, the user service demand is also constantly changing, and the dynamic is still the basic technical problem to be seriously considered in the construction of modern power grid. The fifth feature is the functional diversity of resource autonomy and external management: Based on the grid management node internal management autonomy and external management can be controlled and integrated management is the main feature of the whole grid, hierarchical resource management needs to be hierarchical management, hierarchical use of grid management node to autonomous resource ownership control and management performance need to be considered.

(2) Educational resource metadata model

"Technical specification for educational resources construction" defines the construction materials of China's educational resource system as four important levels of China's education resource system construction, which can be divided into eight categories: educational media publicity materials, problems, papers, literature, courseware, cases, common technical problems and index of educational resources construction catalogue. The construction of network education curriculum system, the quality evaluation of resource curriculum construction, the design and development of educational resource use management information system. In these different levels, the comprehensive construction of network education curriculum and other material basis education resources is undoubtedly the most needed. A standardized education foundation, key points and harmony is the core. In order to evaluate the quality of resources and choose the way, it is necessary to establish a standardized evaluation standard. The tool is a multi-level overall construction. The specific content of e-learning courses and other material learning resources may be different due to their own technical characteristics. The corresponding enterprise management system must be able to adapt to the continuous change of this management form, and must make full use of their basic characteristics. This paper needs to consider this problem is how to use the simplest metadata model of university education resources to achieve efficient and reasonable organization and optimal management of university education resources, that is, the efficient construction of university education resources database. The key problem to be considered is to establish the information classification management system of educational resources and the management function of educational resources management database.

5. Conclusions

In the network teaching mode of computer education resources structure research and metadata model, this paper focuses on the application of network teaching mode in computer education. Through the research, this paper thinks that the network teaching mode is an important part of computer education. Through the investigation and analysis of different groups of people, we can get their satisfaction with the reform of computer teaching. We are faced with the current severe teaching pressure environment, which urges us to request all kinds of network technology to serve the development of education. According to the data analysis, the network teaching mode has the advantages of multimedia, non-
linear and independent, which can promote the development of computer education. According to the research and analysis of the results of this paper, to make full use of the application of network teaching mode in computer education, we must effectively combine these two kinds, take the teaching status of computer education as the starting point, pay attention to the introduction and Realization of science, and ensure the healthy development of computer teaching. This research has achieved ideal results and made some contributions to the research of computer education resource grid architecture and metadata model under the network teaching mode.

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