



# College Library Assisted Online Teaching Model Based on Cloud Service

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**Abstract.** Due to the low suitability between online teaching and learners, the teaching effect of online teaching is not ideal. Therefore, this paper puts forward a college library assisted online teaching model based on cloud service. On the analysis of the cloud services on the basis of the auxiliary in the teaching characteristics, constructs the contains learner characteristics analysis module, design module, the task group composition design module and learning resource design module of the online teaching model, using cloud services for university library resources characteristics were extracted, combining the resources of the university library association rules matching features and characteristics of learners, Realize the design of teaching resources. The results show that the degree of fitness, teaching resource satisfaction, teaching activity satisfaction and communication mode satisfaction of design students are 86%, 80%, 87% and 83% respectively, and it is very helpful for the improvement of comprehensive quality.

**Keywords:** Cloud service · University library · Auxiliary online teaching model · Learner characteristics analysis · Resource characteristics · Association rules

## 1 Introduction

In today's society, science and technology are developing very rapidly, and the international competition is becoming more and more fierce. Mankind has entered a new era of learning resource development. The rapid development of science and technology has gradually improved the intelligent level of human life. In order not to be abandoned by modern society, the importance of lifelong learning and lifelong education has been recognized by more and more people [1, 2]. In the face of the rapid growth of personalized learning needs and challenges to the limitations of the traditional education model, the traditional face-to-face, mass and classroom-based education has been unable to meet people's needs. With the increasing popularity of computers and the rapid development of learning resource technology, modern online education has become one of the important hotspots of network research and application. It uses the network communication technology of computer as the medium, and adopts the means of multimedia learning resource technology to realize the integration and interactive sharing of teaching resources and learning resources, and give full play to the power of Education [3–5].

This new educational model based on computer learning resource technology has opened up a new era of modern education and provided strong support for the development of popular education. With the national attention to vocational education and the deepening of vocational education reform, the teaching means and teaching methods of secondary vocational schools have been greatly improved. In recent years, electronic whiteboards and multimedia network applications can be seen everywhere in the classroom of various schools, and electronic teaching materials and electronic teaching plans have become an indispensable part of the classroom [6]. The use of advanced teaching means and methods increases the capacity of the classroom, reduces the number of teaching hours and improves the timeliness of class. It is the teaching progress brought by modern teaching. However, the new teaching methods have also produced new teaching problems, such as how to make use of modern education and teaching means, how to increase the classroom capacity of daily teaching, how to speed up the teaching rhythm and enable students to master the teaching content more deeply and efficiently; Facing different students' learning ability, learning efficiency, learning foundation and learning needs, how to complete teaching tasks has become a problem that should be studied in modern school education reform [7]. In view of the problems brought by modern teaching methods, this paper puts forward the method of online auxiliary teaching outside classroom teaching by using the characteristics of high-speed sharing of network learning resources, so as to reasonably allocate limited educational resources, enable students to obtain more teaching resources through the network and improve the efficiency of learning. The advantages of online assisted instruction are mainly reflected in the following aspects: First of all, we will carry out in-depth reform of education methods. Under the new teaching mode of online assisted teaching, students become the subject of learning, and they can independently explore and learn in various network virtual environments, and even learn the required knowledge in practice or even in games [8]. Although as a teacher in teaching will still be in a relatively important position, but more just play a role of guidance and help students to learn. Secondly, space and time are expanded. Teachers' teaching activities and students' learning activities are no longer subject to the same time and space. Teachers and students can choose different time periods and different places to study according to their actual situation. Students can also choose a more suitable time and pace to study. Teachers can also set different times for lectures and group discussions. Third, education and teaching media to achieve diversification. The education mode and teaching content are no longer limited to the oral description of teachers and rules and regulations in books, but the combination of text, graphics, video and audio of various media as the carrier of network learning resources. The comprehensive teaching content that stimulates multiple senses is conducive to creating situational and cognitive changes [9]. Finally, the education population began to be democratized. Benefiting from the modern online education model, teaching activities can no longer be limited to students of one major and one class. As long as people are interested in this course, they can learn and communicate online anytime and anywhere. The expansion of the scope of education also provides the possibility for the realization of lifelong education [10].

Based on this, this paper puts forward the design and research of College Library assisted online teaching model based on cloud service, analysis of cloud services in

auxiliary features in the teaching, building contains the learner characteristics analysis module, design module, the task group composition design module and learning resource design module of the online teaching model, combining the resources of the university library association rules matching features and learners, to realize the design of teaching resources, and a test was carried out. Through the research, we hope to provide help for the development of online teaching. The results show that the design students' adaptability to the design model, teaching resources satisfaction, teaching activity satisfaction and communication mode satisfaction are high, which is helpful to improve the comprehensive quality.

## **2 Analysis on the Characteristics of Cloud Service in Assisted Instruction**

### **2.1 Resource Sharing**

Cloud service assisted online teaching is built on the basis of learning resource technology, with network characteristics and resource sharing. Through this assisted teaching model, each teacher can make all students use their carefully made teaching videos, electronic teaching materials, PPT courseware, electronic documents and other teaching resources, Cloud service assisted online teaching can maximize the sharing of teaching resources [11]. In the traditional teaching method, only a small part of teaching resources can be fully utilized by students, while in the auxiliary teaching model, students can use all kinds of resources anytime and anywhere. These resources include ppt courseware, teaching videos, test question bank, Q & A and discussion provided by teachers. Students can also learn other courses outside the subject according to their own interests. All kinds of teaching resources in cloud service assisted online teaching will be shared. This sharing of resources can not only make teaching resources spread in the classroom, but also beyond the classroom and spread in a wider range, so as to improve the utilization of teaching resources.

### **2.2 Flexibility of Learning Style**

The biggest feature of the model is that students can enjoy the maximum flexibility of learning without the limitation of the wall. Compared with traditional teaching, the use of auxiliary teaching model can learn at any time and anywhere, and can make the learning methods diversified. This provides great convenience for students who are absent and can't keep up in class. Students can adopt other learning methods besides traditional classroom learning methods according to their own characteristics, such as autonomous learning, cooperative learning and exploratory learning. In addition, students can choose the learning content more flexibly. The auxiliary teaching model also has flexibility in teaching evaluation. It can not only adopt the traditional evaluation method, but also conduct comprehensive evaluation according to students' online time, communication degree and so on.

### 2.3 Learning Integration

As an extension of subject classroom teaching, online teaching assisted by cloud service can not only provide students with rich and diverse high-quality resources, but also closely combine with classroom teaching content and implement unified management. Nowadays, FTP, e-mail and other services commonly used by teachers play an auxiliary role in teaching, but they are relatively independent models and cannot be closely combined with classroom content [12]. The cloud service assisted online teaching is to complete various links in the process of teachers' teaching and students' learning in a unified model, which is closely combined with classroom teaching to realize the real integrated management.

## 3 Construction of Online Teaching Model Assisted by University Library

### 3.1 Learner Feature Analysis Module

The characteristics of learners are analyzed from four aspects: general characteristics, starting ability analysis, learning style and learning motivation. General characteristics mainly refer to the psychological, physiological and social characteristics of learners, which are inherent in their peers and easy to be understood by teachers; The main purpose of understanding learners' starting ability is to understand what knowledge and skills learners have before learning new subject content, students' ability to master learning resources and technology, and their learning attitude towards the learning content; Learning style mainly refers to learners' learning style and learning tendency with personality characteristics, such as field dependent and field independent style, concrete and abstract style, etc. mastering learners' learning is helpful to teachers' teaching; Learning motivation refers to the driving force of learners' learning activities, that is, learning motivation. Motivation plays an important role in people's behavior and activities. Mastering

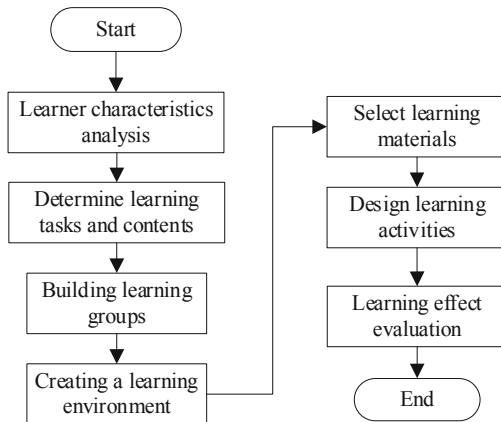


Fig. 1. Composition of learner feature analysis module

learners' learning motivation can make use of students' learning. Learners' characteristic analysis can generally be obtained through questionnaire survey. Figure 1 is the implementation flow chart of the learner feature analysis module designed in this paper.

### 3.2 Learning Task Design Module

Learning task design is the focus and core of the whole collaborative learning, which can make learners clear their goals and solve problems. In the collaborative learning environment under the cloud computing assisted instruction platform, learners' learning and application of relevant knowledge and the cultivation of learners' comprehensive ability are the core of collaborative learning, so we should pay more attention to problem-solving and design learning task design. The following problems should be fully considered in the design of learning tasks.

- (1) The designed task should be open, and the standard of exploration results cannot adopt the "correct" or "incorrect" way. The problem-solving process not only expects learners to master basic theoretical knowledge, but also requires learners to actively participate in the collaborative learning process, so as to cultivate learners' ability to apply theoretical knowledge with practical application and solve problems.
- (2) The design of tasks should be suitable for the characteristics of learners, preferably within the scope of learners' proximity to the development area, otherwise it is easy to attack learners' learning enthusiasm.
- (3) The completion of the task depends on the network and adopts a cooperative way. At the same time, there are opportunities for autonomous learning.
- (4) The design of learning task should be close to learners' life and have a certain real situation, so as to stimulate learners' learning motivation.
- (5) The results of learning tasks should be easy to generate and submit.

### 3.3 Learning Group Composition Design Module

Grouping is an important link in collaborative learning. Learners can complete certain teaching objectives only when they study in groups with good organizational structure. Therefore, whether the group is established reasonably directly affects the learning effect and quality of learners. There are many ways to form groups. At present, homogeneous grouping and heterogeneous grouping are more widely used and more suitable for collaborative learning. Combined with the specific situation, when grouping, through communication with learners, the author adopts the grouping method of "heterogeneity within the group and homogeneity between groups" (the number of people in each group is controlled at 2 – 5). The method of "intra group heterogeneity" is based on vygowski's zone of proximal development theory, which emphasizes that there is a gap between people's actual development level and potential development level, which can be reduced with the help of peers, teachers and experts. The way of "group homogeneity" can maintain a level of strength among groups, make a competitive atmosphere among groups, and maintain and encourage the progress of collaborative learning.

### 3.4 Learning Resource Design Module

Learning resources refer to all relevant elements that learners can use in the learning process, including people, money, materials and learning resources that can support learning. The learning resources in this paper mainly refer to teachers, peers, teaching materials, network resources, etc. in collaborative learning, the design of these learning resources is not only restricted by the characteristics of learners, learning tasks and platform conditions, but also designed for collaborative learning activities, not for learners. Therefore, when learning resources, the resource design should follow the following principles:

It is closely related to collaborative learning activities. Learning resources provide support for collaborative learning. Therefore, the higher the correlation, the greater the help to collaborative learning. The design of resources should be diversified. It is better to have both pictures and sounds, and be able to support the development of collaborative learning activities from different angles, meet the personalized requirements of learners, and facilitate the retrieval and search of resources; It emphasizes learner centered, and whether the design and selection of resources are reasonable depends on whether these resources can help learners find, explore and solve problems in collaborative learning, actively participate in collaborative activities and construct the meaning of knowledge.

It pays attention to the creation of situation. Constructivism theory emphasizes that learning should be carried out under the relevant social and cultural background. Therefore, the design of learning resources should be connected with vivid and vivid real life, which helps to stimulate learners' Association, extract relevant knowledge from learners' long-term memory, and make them complete the meaning construction of knowledge.

#### Feature Extraction of Learning Resources Based on Cloud Services

The classification of learning resources is based on the accurate extraction of data features. Considering the obvious diversity of the types of learning resources in university libraries, this paper takes the gain of learning resources as the basis of feature extraction.

Firstly, as a common cloud service content, the application of learning resource gain is relatively mature. When extracting the characteristics of learning resources in university library, take the characteristics in learning resources as the basis of gain calculation, and count the times of target feature words in learning resources. Assuming that in a university library, the number of occurrences of the characteristic word  $a$  of category  $A$  is  $x_a$ , the corresponding learning resource gain can be expressed as:

$$I_G(a) = \frac{x_a}{A} \log a \quad (1)$$

In the formula,  $I_G(a)$  represents the learning resource gain with respect to keyword  $a$ . In this way, the learning resource gain in the learning resources of different classification categories and corresponding keywords in the data to be classified is calculated. The difference of learning resource gain is taken as the determination result of learning resource characteristics, which is expressed as:

$$\Delta I_G(i) = \sum_{i=1}^{x_i} \frac{x_i}{i} \log p(x_i) \quad (2)$$

In the formula,  $\Delta I_G(i)$  represents the difference in the gain of learning resources,  $x_i$  represents the number of  $i$  category feature words,  $i$  represents the attribute features in learning resources, and  $p(x_i)$  represents the frequency. In order to ensure that the classification results meet different classification requirements, the standard of  $\Delta I_G()$  is set to adjust the accuracy of feature extraction, so that the resource allocation results have different support.

### Resource Combination Based on Association Rules

According to the above feature extraction results, association rules are established to mine the deep relationship between learning resources under different attribute features, so as to improve the reliability of resource combination results.

Firstly, based on the feature extraction results of learning resources, this paper establishes an evaluation function to calculate the feature similarity between learning resources and learners. Therefore, taking  $\Delta I_G()$  value as the standard and  $\Delta I_G() = 0$  as the center, calculate the distance from learning resources to the center, which can be expressed as:

$$d(i) = 1 - \sum_{i=1} \frac{x_i}{i} \log \frac{p(x_i)(1 - p(x_i))}{r} \quad (3)$$

In the formula,  $d()$  represents the distance from different data to be classified to the corresponding feature center, and  $r$  represents the target radius. According to formula (3), calculate the relevance between the feature word and the center. When  $d(i) \leq r$ , it is considered that the corresponding feature meets the classification standard of category  $i$ . When  $d(i) > r$ , it is considered that it has weak correlation with category  $i$  and does not have obvious  $i$  category features.

According to this way, the internal relationship between learning resources is analyzed to realize the resource combination design.

## 4 Cloud Service Assisted Online Teaching Practice

### 4.1 Preliminary Preparation for Teaching Practice

#### Teaching Content Analysis

This research takes the course of java object-oriented programming as an example. It is a compulsory course for the major of computer science and technology in our university. This course is a skill and application-oriented course. Students are very interested in the study of this course. This study adopts the textbook compiled by Ma Difang, Xu Baomin and Chen Xudong. The textbook is comprehensive and targeted, with special emphasis on the practicality of the textbook. Based on Java se6, the textbook comprehensively introduces the functions and technical characteristics of Java language. The main contents include basic knowledge of Java language, object-oriented programming technology, UML, exceptions, assertions and logs, input and output, generics, collection

framework, multithreading, graphical user interface, network programming and so on. The study of this course can lay a solid foundation for students' further study.

### **Analysis of Teaching Objectives**

According to the analysis of the learners of java object-oriented programming, the general teaching goal of java object-oriented programming is determined.

- ① Knowledge and skill objectives: master the basic norms and skills of programming with Java, and master the design idea of object-oriented programming. Master the basic skills of debugging Java programs, modular applications and the basic process of testing and running complex applications through programming. Lay a good foundation for students' further study in the future.
- ② Process and method objective: to cultivate students' practical operation skills through computer experiments. Teachers pay attention to the cultivation of students' thinking ability and comprehensive application ability by formulating detailed learning tasks. In addition, we should also pay attention to cultivating students' ability to use computers to obtain, process and store learning resources.
- ③ Emotional attitude and values objectives: stimulate students' learning interest and enthusiasm, establish correct values, cultivate students' optimistic and positive outlook on life, and cultivate students' communication ability, self-control ability and teamwork ability.

### **Analysis of Teaching Environment**

The classroom equipped with multimedia computer can meet the needs of each student to configure a computer room to complete practical operation; It is a network environment that facilitates the communication between teachers and students and between students. Students can study independently and realize joint cooperative learning. Including Windows XP and other operation models, as well as auxiliary teaching models. In order to improve the scientific results of the experiment, ensure that the experimental environment of the control group and the experimental group is consistent.

### **Analysis of Teaching Objects**

The object of this study is the sophomore majoring in computer science and technology of Bohai University. Most secondary vocational school students lack enthusiasm for learning, and their learning habits are not very good, and their initiative and self-discipline are not high. However, the students of secondary vocational school are more interested in the learning of applied courses, but they lack the ability of autonomous learning and self-discipline. Moreover, they can carry out simple computer operation and use various communication tools and simple software. Using teaching model to assist classroom teaching can not only improve students' learning interest, but also cultivate students' autonomous learning ability and self-discipline ability.

### **Examination Methods of Experimental Courses**

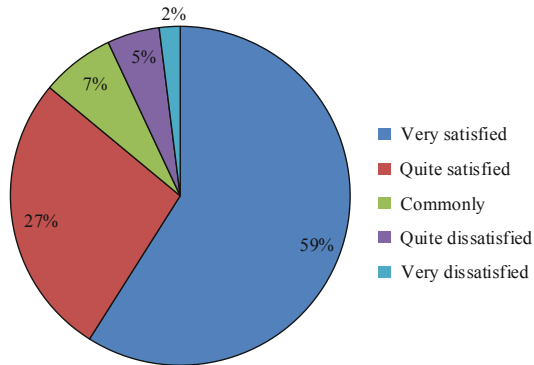
The basis of students' final performance assessment includes: usual homework, practice score, classroom attendance, classroom performance, individual contribution to the

group and final report results in group cooperative learning, formative evaluation of course learning results and summary evaluation of achievements in the final examination.

## 4.2 Analysis of Teaching Effect

### (1) Student Fitness

We divide the students' adaptability to the teaching of auxiliary teaching model into five levels. Most of them choose "relatively adaptive", and some students think that generally, only a few students choose "relatively maladaptive" and "very maladaptive". Survey data show that the vast majority of students can better adapt to this new teaching method. The specific data are shown in Figure 2.

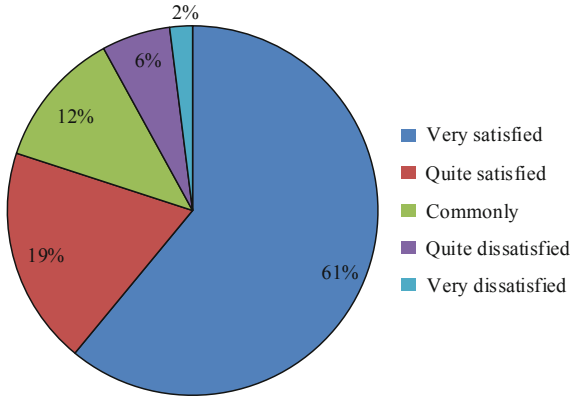


**Fig. 2.** Statistical results of students' Fitness

As can be seen from Figure 2, the number of students who are fed back to adapt to the auxiliary teaching model designed in this paper accounts for 86%, indicating that it can meet the learning habits of students.

### (2) Learning resource satisfaction

In the process of recording, adapting and selecting learning resources, although teachers spent a lot of time and energy, the survey results of students' satisfaction with learning resources did not achieve our expected results. The survey results show that most students feel that the knowledge of learning resources provided by teachers is general, and up to 18% of students are not satisfied with the resources and think it is not helpful to themselves. We also conducted in-depth interviews with students and found that many students believe that although the learning provided by teachers is very rich, the difficulty is not well mastered, so that students do not know how to choose when they conduct autonomous learning before class. Figure 3 shows the specific data of learning resource satisfaction.

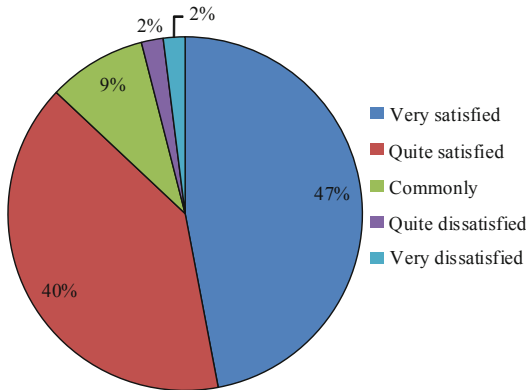


**Fig. 3.** Statistical results of learning resource satisfaction

As can be seen from Figure 3, the number of students who are satisfied with the feedback of resource allocation of the auxiliary teaching model designed in this paper accounts for 80%, indicating that it can meet the learning style of students.

(3) Learning activity satisfaction

In the course, teachers provide students with very rich learning activities, stimulate students' interest in learning, and create a relaxed and pleasant classroom teaching atmosphere. The vast majority of students are satisfied with the design and organization of learning activities. The students' satisfaction with learning activities is shown in Fig. 4.

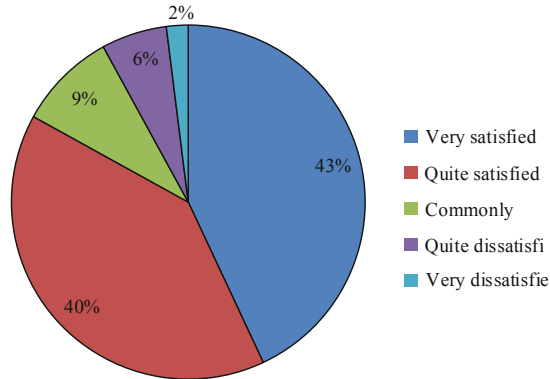


**Fig. 4.** Statistical results of learning activity satisfaction

As can be seen from Fig. 4, 87% of the students are satisfied with the activity setting feedback of the auxiliary teaching model designed in this paper, indicating that it can meet the learning needs of students.

#### (4) Satisfaction of cooperation and communication methods

For the satisfaction of cooperative communication, most students feel that group communication is helpful to their learning and thinking. Some people don't agree. They think that individual students have a dependency mentality, and the group work is expected to be completed by the team leader, so it's not helpful. Figure 5 shows the statistical data of students' satisfaction with the communication methods of each group.



**Fig. 5.** Statistical results of communication satisfaction

As can be seen from Fig. 5, the communication mechanism of the auxiliary teaching model designed in this paper accounts for 83% of the students, indicating that it can meet the learning needs of students.

#### (5) Teaching effect evaluation

We have investigated the learning effect from many aspects, including the mastery of basic knowledge, practical operation ability, autonomous learning ability, problem analysis ability, problem-solving ability, learning interest and motivation. The survey results show that some students believe that this learning mode improves their practical operation ability, while others believe that it is helpful for them to master basic knowledge. Some students feel that this teaching mode has improved their learning interest and motivation. The specific data of teaching effect evaluation are shown in Table 1.

As can be seen from Table 1, the vast majority of students are quite satisfied with the teaching model based on cloud service assisted online teaching. Cloud service assisted online teaching gives students a certain degree of freedom in learning time and space, and allows students to arrange their own learning rhythm. Various learning resources uploaded by teachers on cloud service assisted online teaching can improve students' learning attitude, increase students' interest in learning, and significantly improve students' autonomous learning ability and classroom participation. Through group cooperative learning, the interactive atmosphere in the classroom has been greatly improved,

**Table 1.** Statistical table of learning effect /%

Name	Very helpful	To be helpful to	Commonly	Hardly helped	It didn't help at all
Mastery of basic knowledge	16.28	49.01	29.95	4.67	0
Practical operation skills	20.40	48.65	28.55	1.40	0
Autonomous Learning Ability	29.95	41.50	28.55	0	0
Ability to analyze and solve problems	23.30	70.06	10.52	3.77	2.37
Learning interest and motivation	19.10	40.91	40.00	0	0

which not only enlivens the classroom atmosphere, but also improves students' communication and communication ability, It ensures the learning efficiency and significantly improves the students' academic performance, so as to improve the teaching effect.

## 5 Conclusion

The university library assisted online teaching model based on cloud service is an open and advanced technology, which aims to solve the online teaching problems of teachers for schools, and also solves a series of errors such as omission and false positives in traditional manual management. The librarian-assisted online teaching model developed in this paper considers the advantages and disadvantages of cloud services, including the form of service provided by the distance learning teaching model, the overall design and the form of implementing the model, so that users can operate in the process of using more simple, more efficient and more convenient. Through careful research and design, the design of the teaching assistant model is made and completed, and the initial goal is achieved.

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