A Method of Resolving the Conflict of Shared Resources in Online Teaching of Design Professional Artworks Based on Feedback Integration

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Abstract. In order to solve the problem of massive online teaching shared resources conflict, reduce the error rate of shared resources conflict resolution, and improve the success rate of conflict resolution, the feedback integration concept was introduced. Taking the online teaching shared resources of design professional artworks as an example, the research on the conflict resolution method of online teaching shared resources of design professional artworks based on feedback integration was carried out. First, a strategy model for resolving the conflict of shared resources in online teaching is established. Secondly, the control protocol of teaching resource sharing collaborative service is designed to achieve the goal of intelligent interconnection, resource sharing and collaborative service between online teaching shared resources. Using the feedback integration principle, design an online teaching sharing resource integration and collaboration platform, and integrate the online teaching sharing resources of design professional artworks. On this basis, according to the first come first served resource conflict resolution strategy, resolve the design professional art online teaching sharing resource conflict. The experimental analysis results show that after the application of the new method, the error rate of online teaching shared resource conflict resolution is low, up to 0.2%, and the application effect has significant advantages.

Keywords: Feedback Integration · Design Discipline · Artwork · Online teaching · Sharing Resources · Conflict · Digestion

1 Introduction

Teaching resources are defined in the Education Dictionary: instructional resources refer to various resources that support teaching activities [1]. Teaching resources mainly come from two aspects: on the one hand, they are the original available resources in the real world, and on the other hand, they are resources designed specifically for learning purposes [2].

In recent years, the construction and development of the network platform have achieved remarkable results, playing an important role in promoting student sharing and

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improving the quality of education and teaching. However, due to various reasons, there are problems that can not be ignored and need to be solved urgently in the concept, capital, resources, technology, mechanism and online learning of platform construction. Only through the combination of resource construction and continuous updating, platform construction and technology upgrading, characteristic resources and students' needs, network platform and classroom teaching, the implementation of long-term mechanism, the development of "effective measures" to promote the sustainable development of platform construction, and the realization of full opening of resources and "large area" sharing of students [3].

With the development of education, groups of young teachers have stepped onto the platform of colleges and universities. However, most young teachers lack teaching experience, which leads to poor classroom teaching results and can not meet the expectations of schools and students [4]. The effect of college teachers' classroom teaching has been paid more and more attention by students, teachers and educators. College classroom teaching is not only a simple explanation, but also pays more attention to the effect of explanation and students' welcome to the curriculum [5]. Therefore, how to strengthen the teaching practice ability of young teachers and improve the classroom teaching effect has become an urgent problem for higher education. At present, domestic researchers and educators have proposed various methods, one of which is that teachers can share teaching related resources in real time through online teaching sharing platform. The sharing of teaching resources refers to breaking the original boundaries of teaching resources owned by different schools, different departments or individuals through mature computer technology and modern network technology under the guidance of relevant education departments within a certain area, and implementing the way of shared enjoyment through paid or free ways [6].

China has done a lot of theoretical research and practical exploration on the road of education informatization, and has made considerable progress, such as electronic book bags, distance education, etc. However, we should also see that there are still serious problems of "information island", reconstruction of teaching resources and low utilization rate in China's education at this stage. Using modern information technology to realize reasonable and efficient organization and management of the rapidly growing mass of teaching resources, so that high-quality teaching resources can be orderly co built and shared within a certain region, is an effective measure and way to solve the problems of "information islands" and information reconstruction, and is also one of the important ways to promote China's education informatization, It is of great significance and value to realize educational equity.

However, due to the huge scale of online teaching shared resources, in the actual operation process, resource conflicts, resource overlaps and other issues often occur, which seriously affect the utilization rate of online teaching shared resources, which is not conducive to the sustainable development of resource sharing, and needs to be addressed by scientific conflict resolution methods. The traditional resource conflict resolution method has a high error rate in the practical application process, which can not effectively resolve the resource conflict. Feedback integration can improve this problem, make full use of the output information of different platforms, add feedback links, make the platform from open loop to closed loop, and complete the task of identifying

shared resources in online teaching. Based on this, this paper takes the online teaching and sharing resources of design professional artworks as an example, introduces the concept of feedback integration, and carries out the research on the conflict resolution method of online teaching and sharing resources of design professional artworks based on feedback integration. Firstly, a conflict resolution strategy model for online teaching shared resources was established, which can help solve conflict problems. Secondly, a collaborative service control protocol for teaching resource sharing was designed, which can coordinate the sharing and collaboration of multiple teaching resources, ensuring the smooth progress of the teaching process. Then, based on feedback integration, a shared resource integration and collaboration platform was designed, which can help teachers and students better share and collaborate, and improve teaching effectiveness. Finally, through the method of resolving conflicts in teaching shared resources, possible conflicts that may arise during the teaching process have been resolved, and the quality and efficiency of teaching have been improved.

2 Design of Conflict Resolution Method for Online Teaching Sharing Resources of Design Professional Artworks

2.1 Establish the Conflict Resolution Strategy Model of Online Teaching Shared Resources

The online teaching shared resource conflict resolution strategy model can effectively solve the problem of collaborative work between roles and parallel task resource conflict in the platform, which lays a good foundation for subsequent research.

The conflict resolution strategy model of shared resources for online teaching of design professional artworks established in this paper is shown in Fig. 1.

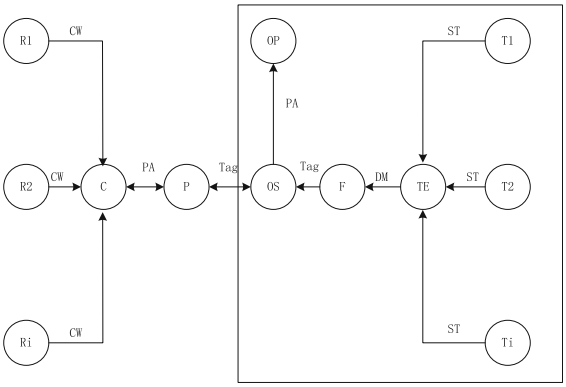

Fig. 1. Conflict resolution strategy model of online teaching shared resources

The model content in Fig. 1 is defined in detail as follows:

(1) R (role set) refers to the attributes of a role, including both the permissions that the role should have and the collaboration between roles.
(2) C (collaborative working set) refers to a set of multiple different roles working together to complete the same task. In the online teaching resource sharing platform, teachers and staff work together to complete teaching resource sharing [7].
(3) T (task set) refers to the attributes of each task in the system, including the relationship between tasks and roles.
(4) OP (operation set) refers to the minimum action set that can perform a certain function. In resource sharing, query, modify, and cancel the reservation object.
(5) OS (shared resource set) refers to the resources shared by parallel tasks. An operation on the shared time and database in the shared platform.
(6) TE (resource application time set) refers to the time when parallel tasks apply for the use of shared resources.
(7) F (Resource Resolution Policy Set) refers to the attributes of shared resource conflict resolution policies. If T has the right to use shared resources $F = (T, OS, OP)$, it means that T can perform OP operation on OS.
(8) P (permission set) refers to the mark of operation on an object. If R has permission $P = (T, OP)$, then R can perform OP operation on T.

In the model, the application of role collaboration and shared resource conflict resolution strategy greatly improves the working mode of the traditional sharing platform, and improves the reliability and accuracy of the sharing platform.

2.2 Design a Collaborative Service Control Protocol for Teaching Resource Sharing

After completing the establishment of the above conflict resolution strategy model for online teaching shared resources, next, design the control protocol for collaborative service of teaching resource sharing to achieve the goal of intelligent interconnection, resource sharing and collaborative service between online teaching shared resources. This paper adopts GCCP, the general control basic protocol, and its hierarchy diagram is shown in Fig. 2.

As shown in Fig. 2, GCCP processing unit completes the general control function of teaching resource sharing of vocational and technical education, and also has it to handle the transmission of shared application data in the network. Point to point and point to multipoint transmission of shared data is completed by the physical layer, data link layer and network layer of GCCP protocol layer. The network protocol in line with the national standard bears the collaborative services between the physical layer, data link layer and network layer [8] for the sharing of teaching resources in vocational and technical education. Among them, the physical layer is the lowest layer of the protocol, responsible for handling direct communication with physical media. In the collaborative service of teaching resource sharing, the task of the physical layer is to convert digital signals into suitable physical signals for transmission, and control the transmission rate and distance of data. The physical layer is also responsible for handling possible errors and interference during the transmission process, ensuring the reliable

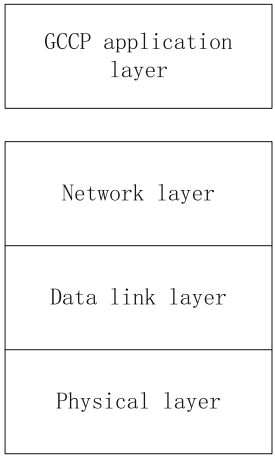

Fig. 2. Hierarchy Diagram of GCCP Collaborative Service Control Protocol

transmission of data. Data link layer: The Data link layer is built on the physical layer and is responsible for dividing the data transmitted by the physical layer into data frames, and providing error detection and correction mechanisms. In the collaborative service of teaching resource sharing, the task of the Data link layer is to ensure the integrity and reliability of data, and detect and correct possible errors in the transmission process through checksum and other mechanisms. Network layer: The network layer is the highest layer of the protocol, responsible for implementing data routing and transmission. In the collaborative service of teaching resource sharing, the task of the network layer is to route data from the sending end to the receiving end, and achieve efficient data transmission by selecting the best path and using appropriate routing protocols. The network layer is also responsible for handling issues such as network topology, address allocation, and packet segmentation and reassembly. In general, the physical layer, Data link layer and network layer constitute the hierarchical structure of GCCP protocol. Each level has specific functions and tasks, and through collaboration and interaction between layers, efficient operation of collaborative services for teaching resource sharing and reliable data transmission are achieved.

In the general control GCCP network for sharing teaching resources of vocational skills education, all protocols involved in realizing interaction are shown in Fig. 2.2, and are completed by device A and device B. The GCCP network for sharing teaching resources of vocational and technical education established consists of core components such as general equipment, controller, configurator and gateway.

General equipment: It is generally the general control equipment of the network shared resource platform.

Controller: the equipment in the shared resource platform that operates and controls general network equipment, such as centralized controller, intelligent control terminal, etc.

Configurator: This configurator completes the configuration of other devices in the shared resource platform network, and assigns Network D and Device D to other devices.

Gateway: It connects two different networks to realize intelligent interconnection, resource sharing and collaborative services of devices in different networks. This core component can connect the IGRSIP main network and GCCP network, or connect two GCCP shared networks. In the shared resource platform network, a configurator is used to configure the functions of all devices, and the configurator configures independent network D and device ID [9] for each device in the network. The GCCP interaction involves protocol schematic diagram, as shown in Fig. 3.

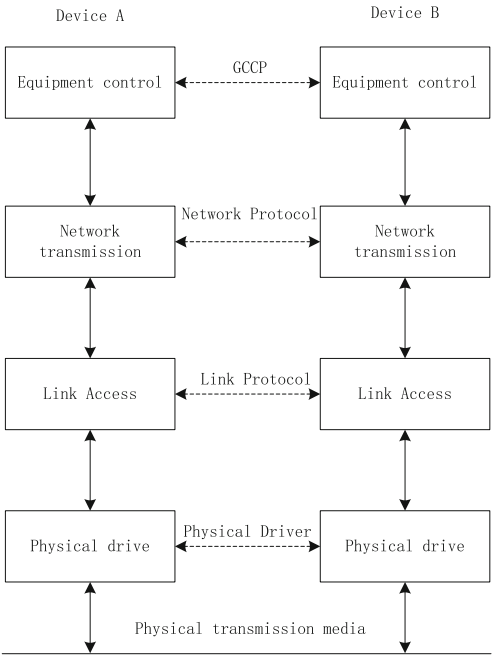

Fig. 3. Schematic diagram of GCCP interaction protocol

As shown in Fig. 3, the network ID consists of two octets, which are used to distinguish different network resources of the shared resource platform and are managed uniformly by the core component - configurator. GCCP interaction involves the protocol used for communication and data exchange between device A and device B. The specific working principle is: (1) Establishing a connection: Before communication between device A and device B, a connection needs to be established through the protocol. This can be achieved through a handshake process, where device A and device B exchange specific messages to confirm each other's identity and communication parameters. Once the connection is established, device A and device B can start transmitting data to each other. (2) Data exchange: Once the connection is established, device A and device B can use the GCCP protocol for data exchange. Device A can send requests or instructions to device B, which then performs corresponding operations based on the received requests or instructions and returns the required response or data to device A. This data exchange may include the transmission of teaching resources, updates of status information, etc.

(3) Message encapsulation and parsing: The GCCP protocol defines the format and structure of messages, and devices A and B need to encapsulate and parse messages in the manner specified by the protocol during data exchange. The encapsulation process combines data and control information into a specific message format for easy transmission and recognition. The parsing process parses the received message, extracting data and control information for use by the device. (4) Error handling and recovery: During data exchange, various error situations may occur, such as data loss, transmission errors, timeouts, etc. The GCCP protocol defines error handling and recovery mechanisms, where device A and device B can perform error detection, retransmission, or other necessary operations in accordance with the protocol to ensure data integrity and reliability.

2.3 Design Shared Resource Integration and Collaboration Platform Based on Feedback Integration

After completing the design of the above teaching resource sharing collaborative service control protocol, next, using the feedback integration principle, design the online teaching shared resource integration and collaboration platform, integrate the online teaching shared resources of design professional artworks, and provide basic support for the shared resource conflict resolution method in the following text.

The construction of networked shared resource database provides an information integration and collaboration platform system, which is mainly used to integrate the existing information and application systems in the campus network. So as to achieve unified control and provide users with a unified access portal. If the platform is supplemented by the campus application of the networked shared resource database construction platform, it is currently integrated and managed according to the existing network resources and campus needs, and the contents of several major modules such as information, search, collaboration, business services, public services, etc. [10]. The network shared resource database construction platform integrates and cooperates the information in the school, combs and summarizes it, and provides personalized information services for users.

The construction of information integration and collaboration platform mainly includes the following aspects:

1. Information integration platform and group management.

(1) Multiple integration schemes such as RSS, IFRAME, WebClipping and URL are provided, which can be integrated with campus and off campus websites, education, academic websites, blogs, network storage applications and other systems.
(2) Provide development level development framework and functional components to meet the requirements of functional expansion and application development; Provides functional components for portlet development on the portal.
(3) It provides the interaction function between user groups, and enables users in the group to manage their access to information. It mainly includes: user group selection, group customization, group free combination, etc.

2. Document storage and sharing services. Documents that provide designated users to browse or manage their own shared files are stored in the sharing service. Sharing is only the sharing of a file or folder. It is a temporary exchange of files between users.Users

can comment on files shared by others, and also view and manage the comment information of files shared by themselves. At the same time, it provides fast search and advanced search, and can search according to different file ranges. The shared platform system provides the user with a client backup tool, which allows the working directory in the user's machine to always be bound to a space in the network storage, so that files can be backed up within a settable time period. The backup function requires the following:

3. Personal collaboration application. Provides functions such as classification, publishing and browsing of notice announcements, and supports WYSIWYG online information editing; The system also supports the top setting, isolation and other functions of notification announcements. It can also be integrated with any module that needs to be reminded to provide centralized reminders and send and receive user messages.

4. Data integration. The integrated central database mode of the data integration platform provides a database mode that meets the needs of school data sharing and exchange. The developed integration interface provides interface support for different types of data sources, including: supporting data integration of mainstream RDBMS, such as Oracle, DB2, Sybase, SQL Server, and InfoMix; Support data integration of non mainstream RDBMSs, such as MySQL, Derby, HypersonicSQL, and PostgreSQL; Support the data integration interface of 0DBC data sources such as Foxpro, Access, Excel, etc.; Support data integration of message type data sources such as JMS Queue and JMS Topic; Support file data integration such as formatted txt and XML; Support data integration of WebService; It supports other special types of data formats, such as data integration of LOB fields (BLOB, CLOB).

5. Data integration KM, topology management tools.

(1) Data integration KM module.

Provide data integration KM library, including more than 100 development packages for various data integration requirements.

(2) Topology management tools.

Manage data sources and scheduling agents, and support various data source interfaces such as RDBMS, text, message, and WebService.

3. Integrated design tools, integrated view tools, and integrated scheduling tools.

(1) Integrated design tools.

Provide graphical interfaces for design and development of data integration projects.

(2) Integrated viewing tool.

View the operation of the data integration project and debug the integration process.

(3) Integrated scheduling tool.

Schedule and control each data integration synchronization task to complete the customized data integration process.

2.4 Conflict Resolution of Teaching Shared Resources

After the above design of shared resource integration and collaboration platform based on feedback integration is completed, the next step is to resolve the conflict of shared resources in online teaching of design professional artworks.

First, allocate online teaching resource samples. According to the analysis of the deficiency of DPC algorithm, the improved algorithm adds a constraint in the sample allocation. MG-DPC algorithm first refers to DPC algorithm to calculate distance δ

And local density ρ. Then find the matching cluster center according to the decision graph heuristic. Other samples of the dataset i Samples with high local density and close distance j In the class cluster of, and the sample i, j They must be close neighbors to each other. If sample i, j If it is not a close neighbor, give the sample i Assign a new class label and mark it as "negative class". Other samples can be allocated to samples i In the negative class. When each sample is allocated, there may be some negative classes, which need to be merged into positive classes. Define 4 cluster boundaries: the definition expression of cluster boundaries is:

$$edge\left(A_p, B_N\right) = \left\{i | j \in MNN(i), j \in B_N, i \in A_p\right\} \tag{1}$$

Among them, A, B Is a class label, A_p Represent class cluster A Is a positive class, B_N Represent class cluster B Is a negative class, $MNN(i)$ Is a sample i The set of neighbors of. Any platform is composed of resources with different characteristics and categories, of which physical resources are easy to copy and purchase in the market, usually in materialized form. To realize the integration of shared resources, certain tools are necessary. In the shared resource conflict resolution method designed in this paper, shared resource integration technology is used to resolve resource conflicts. The integration technology includes mapping, topology and neural network. This paper chooses mapping technology as a means of conflict resolution. In the field of mathematics, mapping refers to the special correspondence between one set element and another set element. Different mapping definitions are generated according to different mapping objectives. Although the definitions of mapping are different, they are essentially the same, such as functions and operators. It should be noted here that the mapping between two number sets is a function, and the other mapping is not a function.The mapping can be defined as follows.

$$m : \langle e_s, e_t, r, k \rangle \tag{2}$$

Among them, e_s, e_t Represent the entities corresponding to the online teaching shared resources in the platform respectively; r express e_s And e_t Relations between them, such as equivalence, inclusion, overlap, etc.; k express e_s And e_t The closer its value is to 1, the more similar the two entities are. Through the mapping function of the integration unit, the shared resources of online teaching will be transformed into the final output information, and the transformation and utilization of shared resource elements will be realized.

When system resource conflicts occur in parallel tasks, they are handled according to the first come, first served resource conflict resolution strategy. Implement $Task_i(T_i)$ The agent of the task is assumed to be $Agent_i(A_i)$, Execute $Task_j\left(T_j\right)$ The agent of the task is assumed to be $Agent_j\left(A_j\right)$, $Agent_i$ And $Agent_j$'s application time is te_i And te_j.

Define 1 Parallel Task Set $T = \{T_1, T_2, ..., T_i\}$, where $i \in N = \{1, 2, ..., n\}$.

Define 2 Parallel Task Execution Set $A = \{A_1, A_2, ..., A_i\}$, where $A_i \in T = \{T_1, T_2, ..., T_i\}$.

Define 3 Request Time Set $te_i = \{te_1, te_2, ..., te_i\}$, where $i \in N = \{1, 2, ..., n\}$.

Execute Task Set $A = \{A_1, A_2, ..., A_i\}$ The decision objective function of is:

$$F\left(te_i, te_j\right) = \begin{cases} A_j, te_i \geq te_j \\ A_i, te_i \prec te_j \end{cases}, i, j \in N = \{1, 2, ..., n\} \tag{3}$$

When A_i And A_j When applying for online teaching sharing resources on the same day and in the same session, if $te_i \prec te_j$, online teaching shared resources are allocated to A_i, i.e. T_i; if $te_i \geq te_j$, the online teaching shared resources will be allocated to A_j, i.e. T_j. When the online teaching shared resources are assigned to an agent for execution, the online teaching shared resources of this session are immediately locked. Once locked, other parallel tasks cannot share the resources of this session, instead, they can reselect other sessions for resource sharing, or wait until the shared resources are unlocked, so as to effectively achieve the goal of shared resource conflict resolution.

3 Experimental Analysis

3.1 Experiment Preparation

The above content is the whole design process of the online teaching and sharing resource conflict resolution method of design professional artworks based on feedback integration proposed in this paper. Before the proposed conflict resolution method is put into practical use, the feasibility and resolution effect of the method need to be objectively tested. Based on this, the experimental analysis is carried out as shown below.

First of all, according to the method and content of the above design, build a highly adaptable online teaching shared resource conflict resolution development and testing environment. The specific requirements of the computer hardware operating environment required for the development of the component sharing platform and the computer software operating environment required for the development of the sharing platform are shown in Table 1.

According to the technical requirements and configuration shown in Table 1, build the development and test environment required for this experiment. In the experimental test, once the knowledge points, steps, organization forms and other contents required for the development of the entire shared resource curriculum are determined, the design and development work specific to a single shared resource can be started. Curriculum shared resources mainly include script development of teacher files and web page sharing content that currently exists in the Internet network. In order to effectively integrate resources into the database of the network shared resources platform, these curriculum resources need to be standardized by SCORM standards. The implementation process is shown in Fig. 4.

Script development and testing of basic data of curriculum shared resources are the data basis for processing shared application business on the platform of networked shared education and teaching resources. The functions related to the shared resource application business in all terminal applications on the education and teaching management platform will be based on the basic data, and the shared application processing will be completed on this basis. The basic data on the enterprise marketing platform has a huge amount of data. For end users with different functions, there are also certain operational permissions for basic data. For information security reasons, end users have the smallest set of basic data visual data under functional permissions.

Table 1. Computer Software Running Environment Settings

Build environment	Name	Technical requirement
Shared resource development environment	CPU	Dominant frequency above 1.7 GHz
	Memory	Above 2 GB
	Hard disk	Above 200 G
	Sound card	Provide (play gallery)
	Monitor	Widescreen display above 15 inches is recommended
	Provide Internet access conditions	The network speed provided shall be more than 100M for wired network card and more than 10M for wireless network card
	Display resolution	It can adapt to different resolutions such as 1024 * 768/1600 * 1280
Shared resource software running environment	operating system	WindowsXP/Win7/Win8
	Develop software requirements	1. Multimedia player software such as Windows Media Player, Flash Player 11.0 and JRE is provided 2. Provide JavaScript, IE Tester and other page development software environments 3. UI based design 4. Shared resource development realizes interactive application development of Flash AS3.0 5. Use Premiere format factory software for video editing and Camtasia 8.0 software for screen recording 6. CSS + DIV to beautify the interface, Flash animation to design two-dimensional images and so on

Basic data is resident data for the terminal application education and teaching management platform, and its huge data volume is not suitable for the communication mode of frequent interaction between the education and teaching management platform and the service portal. Therefore, the development of curriculum sharing resources needs to provide terminal object oriented basic data applications to obtain all basic data information visible under the user's authority at one time, And cache these data on the terminal

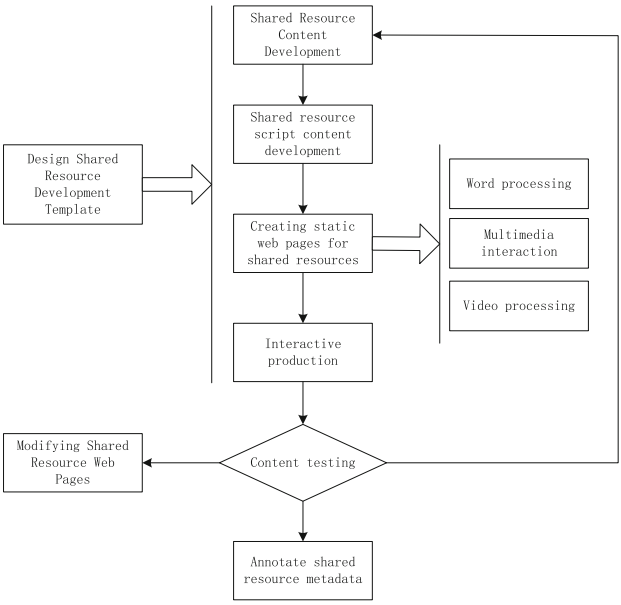

Fig. 4. Implementation process of online teaching shared content development

equipment, so as to reduce the frequent communication and interaction of large amounts of data during the operation of shared applications, improve the education and teaching management platform and the sharing terminal, use the response speed of the system, save the network traffic of terminal equipment, and effectively control and supervise the traffic and sharing process.

After the shared resource module is developed and provided to the database network platform, the shared resource conflict resolution method needs to be tested and analyzed. This paper uses the V-type test model, as shown in Fig. 5, and combines the actual situation of the software of the college education and teaching shared network platform to respond to the quality of the most real software system.

According to the schematic diagram of V-shaped test model in Fig. 5, the conflict resolution method test was carried out, and the page content check, link relationship check and E-browser test were carried out for the production effect of each courseware in a timely manner. This software can test the browser compatibility of courseware. The education and teaching sharing network platform performs the following test phases:

1. Unit test.

The education and teaching sharing network of secondary vocational schools belongs to the category of medium and large software according to the scale of software, so unit testing is very necessary in the process of software system development, and will become the basis for the normal development of the subsequent testing phase. The unit test of the platform should be completed by the developers of all R&D teams, which belongs to the function level test verification link, so that the developers can ensure the reliability of the functions themselves.

2. Function test.

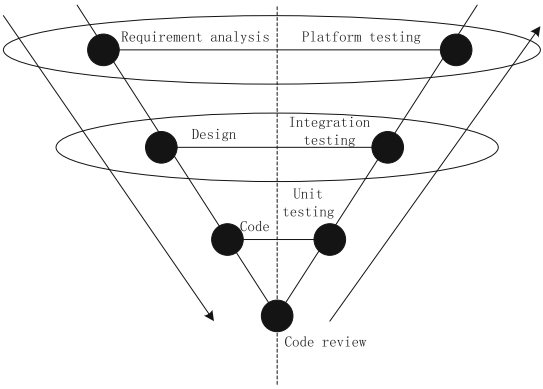

Fig. 5. Schematic diagram of V-type test model

Function test is a test link when each function module of the education and teaching sharing network platform of secondary vocational schools is completed independently. The function test will be conducted based on the unit test results to verify the accuracy and integrity of the functions of each independent functional module. In addition to verifying the quality of functional modules, the design of the software system also achieved the verification effect in the functional test phase. Functional testing is mainly performed and completed by testers.

3. Integration test.

Integration test is a joint test between modules implemented after all functional modules of the education and teaching sharing network platform of secondary vocational schools have been developed. The integration test is performed by testers on the basis of functional test. Through the integration test, it can verify the collaboration ability between the functional modules of the education and teaching sharing network platform, and at the same time verify the effectiveness of the software system design of the system.

4. System test.

The system test is a black box test conducted after the integration test of the education and teaching sharing network platform is completed. It is a process of further comparing and verifying the functions and requirements analysis results of the software system from a macro perspective. The system test is carried out by the tester, which aims to find the contradiction between the developed system functions and the requirements analysis results in a timely manner, and correct it in a timely manner, so as to improve the reliability of the system operation.

3.2 Result Analysis

Test method and process: unit test (white box) - integration test (black white combination) - system test (black box) - acceptance test accompany the software development process.

Test content: performance and pressure test. Test purpose: to test the stability, reaction speed, fault tolerance, compression resistance, etc. of the system. Test method: consciously give wrong or substandard input and test the output results of the system.Test approach: choose the black box test method, and randomly find teachers and students

who do not understand the online teaching sharing resource platform to experience. The test results are shown in Table 2.

Table 2. Results of online teaching shared resource conflict resolution performance test

Operation	Expected results	Actual results	Conclusion
Log in to the system, and enter an inconsistent user name and an incorrect password	Give corresponding error prompts, such as your password is wrong, you have entered invalid characters, etc	Consistent with expected results	Normal
High frequency click the mouse at any position on the interface	The system will not be stuck. If you click to the function area, there will be a corresponding prompt, such as you have not selected to download files	Consistent with expected results	Normal
Halfway through the sharing operation, exit the system by force	You can log in again smoothly, and there will be no data that failed the last operation	Consistent with expected results	Normal
Share many large files at one time, and check all users of the platform	Normal sharing, expected to take a little longer	Consistent with expected results	Normal

According to the performance test results in Table 2, the performance test results of the online teaching shared resource conflict resolution method proposed in this paper are consistent with the expected results, meeting the teaching needs. On this basis, the error rate of shared resource conflict resolution in online teaching of design professional artworks is selected as the evaluation index for this experimental analysis, and the conflict resolution method of shared resource in online teaching of design professional artworks based on feedback integration proposed in this paper is set as the experimental group, and the traditional conflict resolution method is set as the control group. After the application of the two conflict resolution methods, the error rate of conflict resolution of online teaching shared resources for art design majors in X colleges and universities was measured and compared, and a comparison chart of evaluation indicators was drawn as shown in Fig. 6.

From the comparison results of the evaluation indicators in Fig. 6, we can see that after the application of the two methods, there are some differences in the corresponding online teaching shared resource conflict resolution effects. Among them, after the application of the shared resource conflict resolution method for online teaching of design professional artworks based on feedback integration proposed in this paper, the error rate of shared resource conflict resolution is significantly lower than that of traditional methods, with the maximum not exceeding 0.2%. From the comparison results, it is

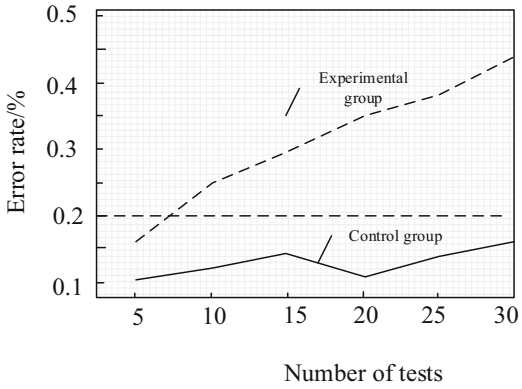

Fig. 6. Comparison Diagram of Evaluation Indicators

easy to see that the method proposed in this paper is highly feasible, effectively avoiding the conflict, asymmetry and other problems of online teaching resources of design professional artworks, and has significant advantages in application effect.

Select a group of design major students as the experimental subjects and provide them with a series of art online teaching and sharing resources, including design cases, video tutorials, learning materials, etc. Design conflict scenarios where multiple students simultaneously choose the same artwork for learning and creation, resulting in resource competition. Calculate the resource utilization rate, as shown in Fig. 7.

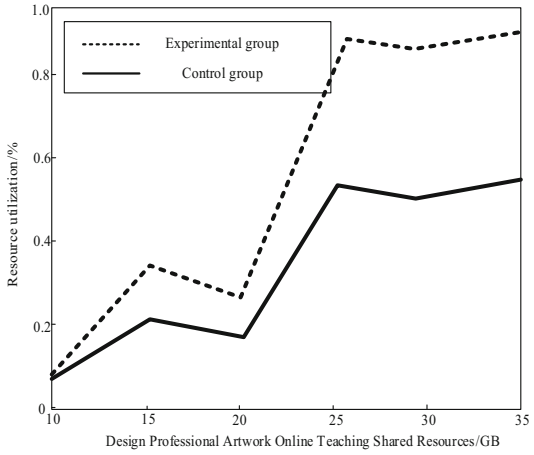

Fig. 7. Comparison of Resource Utilization Results

From Fig. 7, it can be seen that there are certain differences in resource utilization rates between the two methods after application. Among them, the resource utilization rate of the shared resource conflict resolution method for online teaching of design professional artworks based on feedback integration proposed in this article is significantly

higher than that of traditional methods. From this comparison, it can be seen that the method proposed in this article has high feasibility.

4 Conclusion

Facing the limitation of educational resources, in order to improve the full use of existing resources and realize the optimal allocation of educational resources, colleges and universities practice sharing educational resources, which is the path choice for the healthy development of China's higher education system. This paper is based on a feedback integration method for resolving shared resource conflicts in online teaching of design related professional artworks. It combines feedback mechanisms and integrated design ideas to address potential resource conflicts that may arise during the online teaching process. By establishing a conflict resolution strategy model for online teaching shared resources and designing a collaborative service control protocol for teaching resource sharing, collaborative sharing and control of teaching resources have been achieved. At the same time, a shared resource integration and collaboration platform was designed based on feedback integration, providing a collaborative and shared environment for teachers and students. In the future, further research and improvement can be conducted on the conflict resolution strategy model of online teaching shared resources, utilizing more advanced algorithms and technologies to improve the efficiency and accuracy of conflict resolution.

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References

1. Zabolotna, O., Zagoruiko, L., Panchenko, I., et al.: Teaching English vocabulary online: is the screen a barrier?. Adv. Educ. **2021**(17), 57–64 (2021)
2. Yalagi, P.S., Dixit, R.K., Nirgude, M.A.: Effective use of online teaching-learning platform and MOOC for virtual learning. J. Phys. Conf. Ser. **1854**(1), 012019 (8pp) (2021)
3. Liu, L., Tsai, S.B.: Intelligent recognition and teaching of English fuzzy texts based on fuzzy computing and big data. Wirel. Commun. Mob. Comput. **2021**(1), 1-10 (2021)
4. Lu, J., Gao, H.: Online teaching wireless video stream resource dynamic allocation method considering node ability. Sci. Program. **2022**, 1–8 (2022)
5. He, Y.: Design of online and offline integration teaching system for body sense dance based on cloud computing. J. Interconnection Netw. **22**(Supp05) (2022)
6. Tucker, B.V., Kelley, M.C., Redmon, C.: A place to share teaching resources: speech and language resource bank. J. Acoust. Soc. Am. **149**(4), A147–A147 (2021)
7. Zheng, H.Y., Ran, X.C.: Application of QR code online testing technology in nursing teaching in colleges and Universities. Sci. Program. **2021**(Pt.13) (2021)
8. Dong, X., Chen, X.: Research on online teaching of college teachers under the background of education informatization. MATEC Web Conf. **336**, 05005 (2021)

9. Eberle, J., Hobrecht, J.: The lonely struggle with autonomy: a case study of first-year university students' experiences during emergency online teaching. Comput. Hum. Behav. **121**(3), 106804 (2021)
10. Yang, Y., Zhang, M., Wu, B., et al.: Design of simulation system for discontinuity network in rock mass and its application in teaching. Comput. Simul. **39**(9), 5 (2022)