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Research on the co-construction and sharing of teaching resources for the construction of virtual teaching and research section

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Abstract: Under the influence of digital teaching resources and modern information technology, how to co-construction and share high-quality teaching resources has become a basic issue for the construction of virtual teaching and research section. Through the analysis of the characteristics of digital teaching resources and the importance of co-construction and sharing, the protocol mechanism of co-construction and sharing teaching resources is discussed, and a three-step construction method for co-construction and sharing teaching resources based on the online course platform is proposed. Flight Control Course Virtual Teaching and Research Sections with Civil Aviation Characteristic is taken as an example to show the effectiveness of the proposed method.

1. Introduction

The virtual teaching and research section is a new education and teaching support mechanism based on modern information technology, which can be jointly constructed by many parties. According to the different objects supported by the virtual teaching and research section, it can be divided into three types of virtual teaching and research section: professional, course group, and course. For these three types of virtual teaching and research section, there are still many issues that need to be explored and studied in terms of the operating mechanism, development path, and construction content. Among them, the co-construction and sharing of high-quality teaching resources is a basic issue for the construction of virtual teaching and research section [1].

Thanks to the widespread application of modern information technology, the development, application and promotion of teaching resources are undergoing profound changes. The digitization of teaching resources and their wide spreading through Internet technology have accelerated the

application and promotion of high-quality teaching resources. Meanwhile, there are problems of fragmentation of teaching resources and difficulty in ensuring quality. In the context of multi-party participation for the construction of virtual teaching and research section, improving the co-construction and sharing of high-quality teaching resources based on modern information technology to promote the creation and wide spreading of high-quality teaching resources is one of the key issues in the current construction of virtual teaching and research section.

In recent years, many scholars have put forward many viewpoints on the issue of co-construction and sharing of teaching resources for the construction of virtual teaching and research section from different aspects. Starting from the establishment of a teacher development community, Li Shanshou et al. took the virtual teaching and research section of architectural electronics and intelligentization as the research object and discussed the evaluation method and classification management of teaching resources [1]. On the basis of co-construction and sharing of teaching resources, Bai Wei et al. adopted the hierarchical structure of "nodes" such as knowledge units and knowledge points to construct the knowledge graph of the course, further proving the importance of co-construction and sharing of teaching resources [2]. From the perspective of building a cultural environment for cooperation and communication, Xie Jin et al. discussed the integration of co-construction and sharing platforms and ideological and political education resources [3]. Wang Yuancong et al. took the ideological and political education of courses as the research object and constructed a co-construction and sharing mechanism spectrum around content optimization mechanism, incentive mechanism, operation mechanism, management mechanism, guarantee mechanism and feedback evaluation mechanism [4]. He Jia et al. discussed the characteristics of teaching resources under the background of digitalization, analyzed the co-construction and sharing mode of teaching resources, and proposed corresponding construction paths [5]. The above-mentioned scholars applied various teaching and research theories and methods to propose effective resource co-construction and sharing mechanisms for different situations, but lacked problem research and mechanism analysis in the co-construction of virtual teaching and research section by multiple parties.

Under the guarantee of the quality of teaching resources, the co-construction and sharing mechanism can effectively promote the resources needed by each member to meet their talent training goals and their good application in teaching. Based on the characteristics analysis of digital teaching resources, the teaching resource construction content, co-construction methods, sharing mechanism and platform construction, and the effectiveness of the method are studied.

2. Analysis of the Needs for Co-Construction and Sharing of Teaching Resources

2.1. Characteristics of Digital Teaching Resources

The virtual teaching and research section is built on the basis of modern information technology. Most teaching and research activities are realized in digital form, so teaching resources are also transformed from traditional forms to digital forms. Traditional teaching resources are mainly paper textbooks and exercise books, which are taught through teaching tools such as blackboards and chalks, making great contributions to the cultivation of talents. However, limited by expression form of the paper textbook and the speed of textbook publishing, traditional teaching resources are updated slowly, with limited scope of use and interactivity, making it difficult to cultivate personalized skills, which is not conducive to students' mastery and flexible application of knowledge.

After the digitization of teaching resources, the development, storage, transmission and access application of teaching resources have become very convenient. At the same time, the expression forms of teaching resources are diversified, including text, audio, video and multimedia, which

greatly improve the scope of use and interactivity of teaching resources. Moreover, the diversity of expression forms is more conducive to the analysis and understanding of knowledge points, and can realize personalized training, which is conducive to students' mastery and flexible application of knowledge. As shown in Figure 1, based on a variety of expression forms, digital teaching resources can provide students with rich sensory experience and enhance the attractiveness of learning; through mobile phones, computers and other means, students can actively participate in the learning process anytime and anywhere, which improves the effect and interest of learning. At the same time, digital teaching resources are easy to modify and update, and are extremely flexible. Teachers can adjust and customize resources in a timely manner according to training objectives and real-time learning conditions. When training objectives and professional knowledge change, digital teaching resources can be adjusted in time to quickly adapt to new forms to ensure the timeliness and accuracy of teaching content.

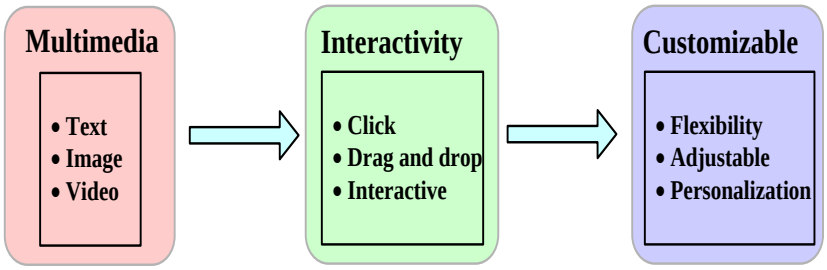

Figure 1: Characteristics of digital teaching resources

However, if teaching resources are still developed and prepared by a single teacher or teaching and research section as in traditional teaching, the advantages of the above digital teaching resources will be difficult to play better. Therefore, under the trend of digital teaching resources, how to gather the strength of teachers in the virtual teaching and research section to jointly co-construction and share teaching resources has become a basic issue.

2.2. Importance of Co-Construction and Sharing

Digital teaching resources facilitate resource sharing among members of virtual teaching and research section. For general professional virtual teaching and research section, it is easy to construct and obtain teaching resources. However, for the construction of virtual teaching and research section with industry characteristics, it is particularly important to better pool the wisdom and experience of members to build a teaching resource library with industry characteristics. The co-construction and sharing mechanism refers to the collaboration between different educational institutions to jointly develop and utilize teaching resources to improve the efficiency and quality of resource use [6]. This mechanism encourages the co-construction and sharing of teaching resources among members, promotes the widespread dissemination and application of knowledge, technology and teaching methods, provides teachers with better teaching options, and students can also obtain diversified learning materials, ultimately meeting the different training goals of each virtual teaching and research section member. At the same time, the co-construction and sharing of teaching resources is conducive to the formation of an open and collaborative educational ecology, promotes the exchange of educational methods and concepts, stimulates educational innovation, and better serves the training goals.

3. Co-Construction and Sharing Agreement and Mechanism

3.1. Co-Construction and Sharing Agreement

In traditional teaching and research rooms, teaching resources are usually only used and circulated within the same unit, and course resources are not digitally constructed and are not easy to spread. However, after the teaching resources are digitized, although it is convenient for members of the virtual teaching and research section to share resources, it also brings about problems such as copyright and rights distribution of teaching resources. In order to ensure the smooth progress of the co-construction and sharing of teaching resources, members of each virtual teaching and research section should formulate a co-construction and sharing agreement on teaching resources, clarify the construction content and form of teaching resources, the responsibilities and rights of all parties in the construction of teaching resources, and how to arbitrate responsibilities and rights, etc., to ensure the reasonable use and protection of co-constructed teaching resources. At the same time, the agreement can add an appendix as appropriate to clarify the co-construction and sharing mechanism, including the co-construction and sharing mode and the co-construction and sharing evaluation mechanism, as well as ways to improve the quality of teaching resources, such as evaluation methods, co-construction and sharing methods, etc.

3.2. Co-Construction and Sharing Mechanism

3.2.1. Co-Construction and Sharing Mode

Since the construction of virtual teaching and research section is based on Internet technology, the construction of teaching resources also requires the selection of appropriate Internet platforms to aggregate the strength of teaching and research room members. According to the current Internet platform content construction mode, the construction of teaching resources can adopt three co-construction modes: designer-led online course platform, community and collaboration platform with full participation, and fully open education resource aggregation platform. The main feature of the online course platform is the centralized mode. Teachers, as designers, lead the design of teaching resources, publish their own course content on the platform, and can refer to other teachers' shared teaching resources to enrich the teaching content. Students can freely access and learn high-quality teaching resources under the guidance of teachers' design. The community and collaboration platform is characterized by a decentralized mode, where teachers and students can jointly participate in the creation, modification and improvement of teaching resources. The education resource aggregation platform is also a decentralized mode, which provides classification, labeling and search functions to facilitate users to quickly search for the required resources. At the same time, the aggregation platform also has certain community and writing functions.

In the co-construction of teaching resources, these three co-construction modes each have their own advantages and disadvantages. In the online course platform mode, since the design and editing authority is in the hands of teachers, the teaching resources can be well protected, but the update of resources will be slow. The decentralized approach of community and collaboration platforms encourages more people to participate, making teaching resources richer and more diverse, and the teaching resources are updated quickly, but the teaching resources are not aggregated and are in fragmented form, which is not easy to serve professional or course teaching. The resources of the education resource aggregation platform are richer and more diverse. Although it provides classification and labeling functions, it is not as professional as the community and collaboration platform. The update speed of teaching resources is relatively slow. The problem of fragmented teaching resources also makes it difficult to serve specific teaching purposes.

Through the above analysis, for the co-construction and sharing of teaching resources in the virtual teaching and research section, since it serves specific course teaching, it is suitable to adopt the online course platform mode.

3.2.2. Co-Construction and Sharing of Evaluation Mechanism

For the construction of virtual teaching and research section, the co-construction and sharing of teaching resources is to meet the teaching needs of each member. In order to ensure the co-construction quality and sharing effect of teaching resources, a co-construction and sharing evaluation mechanism is established. A co-construction and sharing evaluation committee can be established to organize the evaluation channels and feedback mechanisms of teaching and research room members. At the same time, based on the selected co-construction and sharing mode, the shared teaching resources are evaluated and fed back to help each member understand the use and effect of these teaching resources in the actual teaching that serves their own teaching purposes, and further optimize the strategies and methods of resource sharing.

4. Path and Method for Co-Construction and Sharing Mechanism

4.1. Construction path

As can be seen from the above analysis, from the actual teaching needs, the online course platform mode is suitable for the teaching resource co-construction and sharing of virtual teaching and research section. When the specific online course platform is determined, it is necessary to build teaching resources on the basis of the platform. From the use method of the online course platform, the three-step construction path of the general teaching resource co-construction and sharing mechanism can be summarized as follows: First, we need to select a technical support platform. The platform is the basis for co-construction and sharing. Combined with the teaching needs of members, a suitable online course platform and other supporting software are selected. It should be noticed that the platform should support teaching needs and have the ability of efficient data processing and security and privacy protection. The platform should support the exchange and collaboration of knowledge points and promote experience sharing and interaction among members. Second, establish a standardization and interoperability framework. According to the platform use principles, virtual teaching and research section standardizes the form, format and metadata of teaching resources that can support different teaching purposes to form data standardization specifications, and then formulates unified copyright identification and usage guidelines to protect original content and promote resource sharing and reuse. After standardizing the teaching content, format and metadata, the section formulates unified copyright and usage guidelines to protect the original content while promoting the reasonable sharing and reuse of resources. Third, in order to ensure the long-term implementation of co-construction and sharing, it is necessary to establish a culture of co-construction and sharing. By commending high-quality teaching resources, more teachers and students can be encouraged to participate in the co-construction and sharing of teaching resources, and recognize the value of co-construction and sharing of teaching resources, and ultimately form a positive, open and collaborative co-construction and sharing environment.

4.2. Construction method

In the virtual teaching and research section, the most important task is to build teaching resources. The construction method of teaching resources is similar to that of traditional teaching resources, but the construction of teaching resources in the virtual teaching and research section

relies more on Internet technology. Therefore, the teaching seminars, teaching design, evaluation feedback, case analysis, expert guidance, online teaching training and other activities in traditional teaching resources will be carried out online. At the same time, the virtual teaching and research section includes industry members, and attention should be paid to integrating the strength of industry members into the above activities.

(1) Teaching and research activities include online seminars or lectures, online teaching observation and feedback, online collaboration and joint research, etc. These activities are organized through the communication and collaboration platform of the virtual teaching and research section, which encourages teachers to participate in teaching and research, curriculum construction and resource sharing, thereby promoting the construction of teaching resources.

(2) Teaching design includes teaching objectives, teaching outlines and implementation design. Members of the virtual teaching and research section jointly design and optimize teaching content to ensure the rationality and practicality of teaching content. If improvements are made based on existing traditional teaching resources, the role of industry members in this process is very important, especially in the review of teaching objectives and content, which can help determine teaching objectives that are more suitable for industry needs and ensure that teaching content is closer to actual needs.

(3) Evaluation and feedback include evaluation and feedback through questionnaire surveys, interviews, online evaluations, etc. The main focus is on the quality of teaching resources, including practicality, interest, and richness. According to the teaching objectives of each member of the virtual teaching and research section, the evaluation results are analyzed and summarized in a timely manner with the help of statistical analysis software, so as to continuously improve and enhance the quality of teaching resources.

(4) Case analysis includes analysis of successful teaching resource construction cases. Through commonly used online course platforms, excellent virtual teaching and research section teaching resource construction cases are collected, and analyzed from the perspectives of teaching resource construction organizational structure, teaching resource library content, and integration and sharing methods with external resources, so as to improve the construction quality of teaching resources.

(5) Expert guidance includes discussions and guidance on the construction of teaching resources by experts other than members of the virtual teaching and research section. Virtual teaching and research section establishes an expert resource library in accordance with teaching objectives, teaching syllabus and implementation design, then regularly organizes experts to conduct online exchanges and discussions with teachers and students on these aspects. If it is possible, the section should sets up an online expert consultation platform and invites experts to cooperate in the construction of teaching resources.

(6) Online teaching training is different from teaching seminars. It mainly includes online teaching training in the form of practical operation and drills of online course platforms. It aims to improve teachers ' skills in using the platform, teaching design and course development methods, application of teaching methods and strategies, and ability to design and develop teaching resources, so as to improve the construction quality of teaching resources from the design source.

(7) Teaching reflection includes summarizing and sharing the application of teaching resources in teaching practice. It allows teachers in the virtual teaching and research section to gain inspiration from different perspectives, enrich the content and construction methods of teaching resources, timely discover problems in the construction of teaching resources, and continuously improve the construction quality of teaching resources.

5. Effectiveness Analysis

Taking Flight Control Course Virtual Teaching and Research Sections with Civil Aviation Characteristic led by Civil Aviation University of China as an example, the teaching and research section has achieved remarkable results following the proposed co-construction and sharing method of teaching resources. Through the co-construction of teaching resources, teachers have more opportunities to communicate with domestic and foreign experts in the industry, making up for the lack of knowledge in the civil aviation industry; through the sharing of teaching resources, feedback from different colleges and universities on resources has been obtained, further enriching teaching resources and improving the quality of teaching resources. At the same time, it has reduced the workload of teachers and improved the teaching quality. In recent years, around the teaching and research of flight control courses, the teacher team has presided over 3 provincial teaching reform projects, 6 school-level teaching reform projects , published 10 teaching reform papers, and compiled 5 experimental handouts; compiled 2 textbooks, compiled a set of teaching resource co-construction and sharing regulations, and a set of resource co-construction and sharing platform based on SuperStar and a virtual simulation teaching sharing platform, see Figure 2.

(a) Resource co-construction and sharing platform based on SuperStar (b) Virtual simulation teaching sharing platform

Figure 2: Online platforms for course resources

6. Conclusion

Resource co-construction and sharing is the foundation of the construction of virtual teaching and research section. Under the influence of modern information technology, teaching resources are becoming more and more digital and fragmented. How to effectively develop and utilize teaching resources according to training goals is an important aspect of virtual teaching and research section research. Content construction, co-construction mechanism and sharing method can ensure that members' talent training subjects obtain the required teaching resources anytime and anywhere, thereby improving the quality of talent training.

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