



Research on Online and Offline Hybrid Teaching Mode of Information Science Specialty

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Abstract—This paper mainly focuses on the online and offline hybrid teaching mode of information science specialty. First of all, it expounds the current situation of the teaching of the courses of the information science specialty. Then, the concept, resource construction, significance and feasibility of online and offline hybrid teaching mode for information science specialty are elaborated. Then, it puts forward the strategies and ideas of online and offline hybrid teaching mode for information science majors. Finally, it introduces the implementation process of online and offline hybrid teaching mode for the information science specialty. Thus, it provides a reference value for the information science specialty of higher education to carry out online and offline hybrid teaching mode.

Index Terms—Information science major, MOOC, OBE, online and offline mixed teaching mode

I. INTRODUCTION

An important step in the construction of new engineering courses is to "deeply cross integrate and create new ones", which also puts forward new requirements for the education of information science in application-oriented undergraduate colleges. At present, information technology is widely used in all walks of life in China, mobile networks are fully covered in cities, and smart phones are widely used, thus promoting the further reform of the teaching model. Especially in colleges and universities, young students have the ability to learn independently, so the traditional face-to-face teaching is also changing to the online offline hybrid teaching mode under the rapid development of information technology. The online and offline hybrid teaching mode, that is, in the process of developing a course, both the online self-study part and the offline opposite learning process are organically integrated and complement each other to jointly promote the learning of the course itself, which is not only a teaching mode that college educators are actively exploring, but also an inevitable trend of the development of the times. As an important part of the teaching system of higher education, the major of information science can cultivate outstanding talents in the new era of social development to promote social development. The emergence of new teaching concepts and new technologies has provided a new direction for the teaching of information science courses. Therefore, teachers should constantly enlighten students' ideas, carry out information based teaching activities through online and offline hybrid teaching models, and take students as the main body to stimulate students' innovative thinking, so as to promote students to better master the knowledge and technology of information science.

II. CURRENT TEACHING SITUATION OF INFORMATION SCIENCE MAJOR COURSES

At present, in the teaching process of information science courses, teachers give priority to teaching. Although this can meet the demands of information professional knowledge dissemination, from the perspective of integrity, it has certain limitations in promoting students' independent exploration and practice.

1. Single teaching method

The courses of information science major are oriented to theoretical courses, mainly adopting traditional teaching methods and flipped classroom teaching forms. Although traditional teaching methods can better carry out structural knowledge teaching, they are not conducive to students' practical activities. In the course teaching of information science, students' understanding of practice theory and practice activities is also limited to the course content, which is not conducive to the cultivation of students' divergent practical thinking to a certain extent, and cannot further effectively discover and evaluate practical opportunities. Therefore, in order to effectively solve the teaching problems

caused by a single teaching method, teachers can integrate online similar high-quality curriculum resources, and help students form a systematic information professional theoretical knowledge system by combining online and offline. At the same time, teachers can also invite tutors with certain practical experience into the classroom to provide practical guidance for students.

2. Neglect the connection with practice

As the same as the traditional subject teaching mode, the teaching of the courses of information science is mainly conducted by teachers. Under this mode, students learn passively and lack the status of learning subject, resulting in poor teaching results. At the same time, the teaching focuses on the structural basic theoretical knowledge of the information science specialty, and trains the students' analytical thinking. Because the professional knowledge of information science is highly situational, and the current curriculum teaching method ignores the integrity of practical education, it cannot organically integrate practical knowledge and professional knowledge, which further leads to students' "learning is difficult to use".

3. Incomplete course evaluation system

At present, the evaluation system of courses for information science majors is mainly based on course examination papers and programming examples. Although the evaluation of students' course learning can better evaluate students' mastery of theoretical knowledge, it cannot fully reflect students' ability to identify practical opportunities, integrate practical resources, and practice thinking and practice. Under this evaluation system, students have obtained course credits, but they have not been able to comprehensively evaluate students' practical ability, ability to deal with practical risks, and practical vigilance.

III. OVERVIEW OF ONLINE AND OFFLINE TEACHING MODE

There is a certain relationship between online and offline teaching modes, which affect each other. With the rapid development of Internet technology, online and offline hybrid teaching mode can fully implement the student centered teaching concept in the form of combination of independent learning and guided learning. The so-called online teaching is to use digital teaching resources to guide students to learn, so as to help students complete practical teaching activities, so that they can exercise their abilities in all aspects, and then complete online teaching. Offline teaching is mainly carried out in the classroom. Teachers carry out learning, exploration and practice activities in combination with the actual situation of students, and guide students to complete them in an organized way, so that they can deeply understand relevant knowledge in the continuous exploration, and gradually develop the good habit of independent learning. Integrate online and offline courses to enrich the teaching content, promote the smooth development of teaching activities, and optimize the teaching system.

In the actual teaching process, in order to better apply the online and offline hybrid teaching mode, digital resources



need to be built, and at the same time, some technical support should be obtained. In the course optimization design, according to students' interests and teaching content, we will make micro classes and videos for students, and present rich digital resources, which can mobilize students' enthusiasm for learning, create a good teaching atmosphere, and let students gradually become interested in learning. At the same time, students can learn information technology related knowledge and operation process at any time by using animation and audio resources, and then assist students to master, so that resources can be used reasonably. Therefore, high school IT teachers should be aware of the importance of digital resource construction if they want to better apply the online and offline hybrid teaching model in teaching.

IV. THE SIGNIFICANCE AND FEASIBILITY OF THE APPLICATION OF ONLINE AND OFFLINE HYBRID TEACHING MODE FOR INFORMATION SCIENCE MAJORS

A. Meaning

1. It is an important part of the teaching reform of information science

It is difficult to achieve the teaching goal of the major of information science because students do not pay enough attention to the major of information science. In this context, it is necessary to promote the reform of the teaching mode of the information science major according to the actual situation and psychological characteristics of students, pay attention to the application of the online and offline hybrid teaching mode, and let students actively complete their learning tasks. Furthermore, the teaching practice should be strengthened, so that students can further master the professional knowledge and skills of the science of information, cultivate students' independent innovation ability, and provide students with broader development space.

2. It is conducive to achieving teaching objectives

The ultimate goal of information science teaching is to improve students' information science and technology literacy, and gradually cultivate students into high-quality talents. Through the online and offline hybrid teaching mode, the teaching activities of information science can not only help students' master relevant knowledge, but also gradually achieve the goal of information technology teaching.

3. It is conducive to tapping students' creative potential

Under the background of online and offline hybrid teaching mode, it can provide students with a variety of learning methods such as group mode learning, inquiry learning, and Internet learning. Through these teaching and learning methods, it can ensure the effective development of information technology teaching activities, tap the creative potential of students, and also cultivate students' innovation spirit and promote their own development.

B. Feasibility

In view of the fact that the traditional teaching mode is difficult to support students to achieve the goal of curriculum

achievements, the online and offline hybrid teaching mode can be used to reconstruct the teaching form when carrying out curriculum reform. Specifically, through the organic integration of online learning, offline teaching and offline practice, the goal of curriculum achievement can be achieved. Online learning aims at teaching tasks issued by teachers. The content of students' autonomous learning mainly includes basic theories and professional theories; Offline teaching is mainly to explain the key and difficult points in theoretical knowledge, and focus on the guidance of a series of practical training such as the identification of practical opportunities, team building, resource integration, practice project design and plan writing for students around practical activities; Offline practice refers to that students use the knowledge they have learned and the practical suggestions given by teachers to carry out practical projects and complete the writing of the plan in a learning group.

In the whole teaching process, online resources, students' learning initiative and offline teaching have become the key factors that affect the realization of the curriculum achievement goals. How to build high-quality online teaching resources, fully stimulate students' learning initiative and guide offline practical activities have also become the key driving force of curriculum reform. First, in terms of online curriculum resource construction, we mainly adopt the form of independent construction supplemented by MOOC curriculum resources, so that the online curriculum resource construction and student training plan are more integrated. Specific teaching resources mainly include syllabus, teaching videos, course handouts, exercises, assignments and expanded reading bibliography for students to learn online. The presentation of curriculum resources mainly relies on the learning through teaching platform. Second, in terms of stimulating students' learning initiative, we should change the traditional curriculum evaluation system and introduce a diversified curriculum evaluation system, namely, online and offline learning process and effect evaluation, practical project activity effect evaluation, and project plan quality evaluation. Among them, the online and offline learning process and effect evaluation are mainly based on the evaluation of online learning duration, exercises and offline course performance; The effect evaluation of practical activities mainly evaluates the progress and performance of students' practical project activities; The evaluation of the quality of the practical project plan is mainly to invite project tutors to rate the students' project plans, and also include the awards of practical ability in various innovation and entrepreneurship activities, modeling and other competitions. Third, the guidance of offline practice activities, including the guidance of students' identified practice opportunities, project teams and project implementation models in offline classes; Provide extracurricular guidance for students' practical activities; Guide and optimize the project plan written by students, and further incubate projects to participate in corresponding competitions.



V. STRATEGIES AND IDEAS FOR THE CONSTRUCTION OF ONLINE AND OFFLINE HYBRID TEACHING MODE OF INFORMATION SCIENCE SPECIALTY

A. Strategy

1. Focus on micro class teaching and thoroughly explain key and difficult knowledge

Micro-class teaching can effectively break through the key and difficult knowledge, reduce the learning difficulty to the greatest extent, help students deeply master the knowledge they have learned, thus promoting the effective development of online and offline teaching activities, and ensure the steady improvement of teaching quality. In short, teachers should make use of micro class teaching to enrich online and offline courses, and play the video of micro class for students. Therefore, students can reasonably use fragmented time to learn key and difficult knowledge, so that they can understand the content more thoroughly. When using micro lessons to carry out teaching activities, teachers should search for corresponding micro lesson videos and link them up with each teaching link accurately. On the basis of continuous learning of basic knowledge, students should organize to watch micro lesson videos to deepen the memory of key and difficult knowledge, so that they can fully understand and deeply understand, so as to reduce the difficulty of learning and optimize their knowledge system. In offline course teaching activities, teachers can make full use of the network to find some examples and list them for students one by one; At the same time, we will make corresponding micro lesson teaching videos for students, and show the important and difficult knowledge and application significance in the videos, explain them, and then play them for students, so that students can have some insights from them, so that students can learn better and constantly improve their learning level. In the process of making micro lesson videos, teachers should attach great importance to the construction of digital resources, listen to the suggestions put forward by students, and appropriately take them as a reference, establish the concept of micro lesson design, make novel micro lesson videos for students, strengthen micro lesson teaching, and assist teachers to better explain new knowledge.

2. Optimize the design to stimulate students' interest in learning

Curriculum design is related to the overall teaching quality. In addition to creating a good classroom atmosphere, we can also optimize the curriculum design of the major of information science according to students' interests and hobbies, so that students can become more interested in learning and better master the professional knowledge of information science for practical learning. Therefore, teachers should pay attention to the optimal design of online and offline courses, and take the things that students like as the starting point to design. At the same time, they should also provide more opportunities for students to think and explore, increase the corresponding teaching links, and use online teaching tools to intuitively present abstract professional knowledge for students, so as to give full play to the role of offline teaching, deeply stimulate students' interest

in learning, activate students' thinking, Encourage students to explore constantly to deepen the understanding and memory of knowledge.

In order to optimize the online and offline curriculum design, teachers need to have the ability of teaching and research. Therefore, teachers should communicate with students more to understand the actual situation of students, design problems according to teaching objectives, assign tasks that need students to think, and add interesting discussion links, so that students can not only be the main body, but also promote students to further think in online learning. Before explaining the principle knowledge to students, teachers should find interesting life knowledge related to the principle for students, so as to improve students' interest in the study of the major of information science. At the same time, teachers should also control the teaching time according to the students' mastery of theoretical knowledge, and guide students to further think, so as to strengthen students' ability to integrate theory with practice. In the process of offline teaching, teachers should optimize the curriculum design according to the actual situation of students, design the practical framework of the curriculum, and divide the inquiry task into multiple links to complete, such as theoretical reasoning link and comprehensive practice link. After that, the interesting knowledge of life will be infiltrated into the students at an appropriate time, and the difficulty of learning tasks will be allocated. It is not only necessary to ensure that the theoretical teaching has a certain depth, but also to make the theoretical teaching activities more interesting, so as to stimulate students' enthusiasm for online and offline learning.

3. Clarify teaching objectives and allocate teaching hours

A clear goal can provide guidance for teaching, help teachers find the starting point of teaching, and reasonably allocate class hours. It should not only meet the requirements of the syllabus, but also ensure the progress of teaching to improve teaching quality. Therefore, teachers of information science should formulate teaching objectives from multiple dimensions, especially the dimensions of emotion, knowledge and skills, combine the learning objectives and syllabus at each stage, and adjust the course time according to the actual situation. At the same time, in order to better apply the online and offline hybrid teaching mode in teaching, teachers should also clarify the hybrid teaching objectives, simplify the target content at each stage, and adjust the teaching time according to the actual situation of students' learning and their knowledge mastery, so as to strengthen students' knowledge and skills. Therefore, through this online and offline hybrid teaching mode, students can obtain more knowledge, and under the guidance of specific goals, students can actively participate in learning and cooperate with teachers to complete the actual teaching tasks, so as to improve the learning level and obtain better teaching results.

4. Choose extracurricular materials to expand students' knowledge

Undergraduate students have the awareness of independent learning. Therefore, teachers can properly select some extracurricular materials for students to learn, which can not only expand students' knowledge, but also broaden their



horizons. On the basis of learning extracurricular materials, students can also contact the knowledge they have learned before, which can not only improve their own knowledge system, but also expand the limited learning field. Teachers should present the content that is not in the high school information technology textbooks, and stimulate students' thinking in the process of offline teaching, so that they can continue to explore, so that they can analyze, infer and verify the basic theory according to some extracurricular materials, so as to enrich their own knowledge system. In the process of selecting extracurricular materials, teachers should fully consider the connection between online and offline courses and provide students with the required learning materials. Teachers can also provide students with various learning resources according to the requirements of the syllabus, so that their offline courses and online courses can be seamlessly linked together to reflect the application value of extracurricular materials. Specifically, according to the requirements of the syllabus, teachers can search for extracurricular materials related to basic knowledge on the Internet, provide students with practical manuals, compare and analyze with the textbooks together with students, and enable students to learn some skills in the process of offline learning. In the process of online teaching, teachers can provide students with some learning websites, and teach students how to search for learning resources, so that students can obtain more knowledge and master more learning skills.

5. Carry out cooperative research activities to cultivate students' collective ideas

In order to ensure the quality of online and offline hybrid teaching, it is necessary to carry out cooperative inquiry activities, so as to cultivate the team spirit among students and improve their collective concept. With the rapid development of big data technology, in the process of online teaching, teachers can use this technology to judge students' comprehensive abilities, and then divide groups for students according to the actual situation of students to guide them to work together to complete the task, so as to mobilize the enthusiasm of students to participate in activities and form a good collective concept. Teachers should make corresponding adjustments to the existing curriculum form according to the specific feedback information of students, so that students can always maintain high enthusiasm in the process of cooperative inquiry learning to improve their learning level. However, due to the differences in the development of students' thinking, some students have not formed a good collective concept in the process of cooperative inquiry, which affects the progress of members' common learning. Based on this, in the process of group cooperation inquiry, it is necessary for teachers to provide targeted guidance to students, so that each group can consolidate the knowledge learned in the past through cooperation, so as to exercise students' thinking and cultivate their sense of teamwork. In the process of online and offline teaching, students are likely to be influenced by different ideas and have a psychological dependence on learning, which makes cooperative inquiry activities difficult to play its due role. Therefore, in the cooperative inquiry activities, teachers should design learning plans with different

difficulties according to the situation of each group, and then lead students to complete the assigned learning tasks in a cooperative way in online and offline courses, which can not only exercise students' information technology operation ability, but also cultivate students' team spirit and form a collective concept.

6. Supporting practical training to cultivate excellent practical spirit

The online courses for information science majors are not limited by time and space. They can also bring good learning experience to students, and strengthen supporting practical training. To a certain extent, they can cultivate students' excellent practical spirit, ensure the effective development of practical activities, and strengthen students' professional skills. For teachers, different supporting practical activities can be infiltrated into online teaching to guide students to accurately use learning software to complete some practical tasks. With the rapid development of Internet technology, teachers can use the Internet to correct students' homework and provide proper guidance for students. This can not only improve the teaching progress, but also cultivate students' practical spirit. Teachers need to assign practical tasks for students according to the actual operation goals, and let students complete the exercises online by operating various simulation software. Finally, the online evaluation system will make corresponding comments on the students' completion. In the process of offline teaching, teachers should assign practical operation tasks to students according to their theoretical learning achievements and guide them to master relevant theoretical knowledge. It is obvious that there are some differences between online courses and offline courses. Teachers should upload the corresponding exercises to the online teaching platform, let students do the exercises, test their learning achievements in specific practice, and then make corresponding adjustments according to the evaluation made by the online comment system. When carrying out supporting practical activities in offline teaching, teachers can infiltrate theoretical knowledge for students in simple basic practical exercises, so as to deepen students' understanding and memory of knowledge. Some theoretical knowledge that is easy to be confused is integrated into the advanced practical exercise topics to guide students to carry out practical operations and further improve students' practical ability.

B. The idea of mode construction based on OBE concept

1. New ideas of OBE oriented practical course teaching mode

OBE oriented teaching method is a new result oriented teaching method, which emphasizes that students can master the knowledge of the course by completing the goal of the results. OBE oriented teaching method emphasizes that teachers should design, optimize and construct courses according to students' expected learning outcomes through curriculum education. Generally speaking, OBE oriented instructional design mainly includes four parts: definition of learning achievement goals, realization of learning achievement goals, evaluation of learning achievement goals and continuous optimization. The practical education of college students is characterized by the unity of knowledge



and practice. The cultivation of students' practical ability and the formation of practical awareness depend not only on the teaching of practical knowledge, but also on the consolidation of practical activities. This means that the implementation of the curriculum teaching of the information science specialty needs to have two major elements: practical knowledge learning and project practice, and effectively balance the proportion of the two elements. [13] discussed that according to the observations in this paper, an existing mathematical model of banking capital dynamics should be tweaked. First-order ordinary differential equations with a "predator-pray" structure make up the model, and the indicators are competitive. Numerical realisations of the model are required to account for three distinct sets of initial parameter values. It is demonstrated that a wide range of banking capital dynamics can be produced by altering the starting parameters. One of the three options is selected, and the other two are eliminated. The model is generalized taking into account fractional derivatives of the bank indicators for time, reflecting the rate of their change. Based on numerical calculations, it is established that reduction of the order of derivatives from units leads to a delay of banking capital dynamics. It is shown, that the less the order of derivatives from the unit, the more delay of dynamics of indicators. In all analyzed variants indicators at large times reach their equilibrium values.

2. Clarify the key points of the courses of the major of information science

On the basis of the analysis of the current situation of the teaching of the major courses of information science, teachers should make clear that the focus of the curriculum is mainly around three aspects: the fit between the construction of new engineering courses and application-oriented undergraduate courses, the establishment of students' scientific concept of practice, and the integration of competition and lessons learned. First, build a teaching system for the courses of information science that matches the construction of new engineering courses and the construction of application-oriented undergraduate courses. The school should take the opportunity of the construction of new engineering and application-oriented undergraduate courses, integrate practical knowledge, practical awareness and practical quality, and build a teaching system that integrates the cultivation of practical ability. Second, guide students to establish a scientific concept of practice. In the past teaching, some teachers found that students did not have a strong desire to practice. At the same time, the correct guidance of students' concept of practice is also a problem that needs to be focused on. The concept of practice is the basic attitude and guiding ideology of students towards practical activities, which is plastic. The concept of practice has a direct impact on students' practical knowledge learning and practice behavior. As a teacher, it is helpful to enrich students' practical knowledge and improve students' practical alertness to set up correct aspirations to serve the society and establish career ideals for students. Third, combine practice teaching, practice competition and practice training organically. Teachers should encourage students to actively identify practical opportunities, encourage their

interdisciplinary and interdisciplinary practice project team formation, promote learning through competition, explore practical innovation paths, and conduct practical training.

VI. IMPLEMENTATION PROCESS OF ONLINE AND OFFLINE HYBRID TEACHING MODE

A. Use information technology to develop MOOC resources

1. The Importance of Developing MOOC Resources in Colleges and Universities

- The need to carry out online and offline hybrid teaching. At present, the development trend of higher education is to develop in the form of online and offline hybrid teaching mode, and teaching includes both online teaching process of students' self-study and offline teaching activities carried out face-to-face. Online and offline supplement and promote each other. Therefore, MOOC resources are needed to assist the development of online and offline hybrid teaching mode.
- The need to carry out online teaching. At present, the opinions on online teaching are widespread. Especially since the epidemic, most universities across the country have used online teaching to complete their normal teaching tasks. The development of online teaching, based on MOOC resources, can have a better teaching effect and increase the degree of controllability of the curriculum. At the same time, some courses in colleges and universities also exist in the form of online teaching during the normal opening process, which not only saves teaching resources, but also makes students' learning time more flexible. The premise of online teaching is to have high-quality MOOC teaching resources in colleges and universities, which can not only deliver the teaching content, but also meet the functional needs of homework, test and examination.
- The need to enrich teaching resources. With the rapid development of information technology, the traditional teaching resources are no longer suitable for the learning needs of learners in the new era. With the wide application of smart phones, more and more learners hope to obtain learning resources through learning apps. Therefore, a large number of MOOC came into being. From higher vocational education to undergraduate education to master's and doctoral education, higher education learners at all levels are trying to learn independently based on MOOC resources. MOOC resources not only include the text, pictures and other resources of traditional teaching resources, but also can transfer the learning content faster and more accurately with the advantages of teaching videos. Especially for some learning contents with strong operability, in traditional teaching resources, they are just words on paper, which is not conducive to acceptance and understanding. However, with the support of micro lesson videos, learners can observe the operation process, which is intuitive and vivid, and is more conducive to mastering knowledge and skills. Therefore, it is urgent for colleges and universities to



actively develop MOOC resources, which is the inevitable demand of the development of the times. [14] examined the development and refinement of possible mathematical models for the intellectual system of career guidance. Mathematical modeling of knowledge expression in the career guidance system, Combined method of eliminating uncertainties, Chris-Naylor method in the expert information system of career guidance, Shortliff and Buchanan model in the expert information system of career guidance and DempsterSchafer in the expert information system of career guidance method has been studied. The algorithms of the above methods have been developed. The set of hypotheses in the expert system is the basic structure of the system that determines the set of possible decisions of the expert system. This set, which is crucial in decision-making, should be sufficiently complete to describe all the possible consequences of situations that arise in the subject area. Therefore, it is important to improve the mathematical models of the intellectual system of career guidance.

2. Characteristics of MOOC Resource Demand in Colleges and Universities in the New Period

- **Comprehensiveness.** The more abundant MOOC resources are, the more learning services can be provided for more learners. Therefore, the current MOOC resources in colleges and universities need to be comprehensive and can really play the role of assisting self-study, that is, some students can master all the knowledge of the course through the study of MOOC resources. For example, the design of sketch courses will have choices for different professional learning contents. If MOOC resources cover a wide range, learners can choose appropriate learning content according to their own learning needs.
- **Systematization.** At present, the demand for MOOC resources in colleges and universities has been upgraded from the demand for a course to the demand for a professional course. Learners hope to obtain a series of logically related MOOC resources developed for a specific specialty. In this way, the knowledge and skills of the specialty can be introduced comprehensively and systematically.
- **Visualization.** At present, learners' demand for MOOC resources is mainly to obtain visual teaching resources. Compared with traditional text learning, learners hope to obtain learning content through video. Especially for some teaching contents with strong operability, such as the related operation of computer software, the use of tools, equipment, machine tools, etc., the teaching video can clearly show the process and steps of operation, which is real, intuitive and more conducive to learning.
- **Aesthetics.** At present, due to the rich network resources, learners also have high requirements for aesthetics when selecting learning resources. In particular, document production and video production have put forward higher standards. If video production is boring, learners will lose interest in learning and give up the MOOC. Therefore, MOOC resource developers

in colleges and universities are required to use modern information technology to make MOOC into a video resource with both technical content and aesthetics.

3. MOOC resource development process

- **Curriculum resource planning.** The course content is divided into the first level directory, the second level directory and the third level directory through resource planning. Determine the required resources under the three-level directory. Generally, the primary directory can be designed as modular or chapter type. The secondary directory can be set as project type, task type, or section type. The three-level directory usually displays various teaching resources, which can be used as learning resources in the form of documents, pictures, PPT, audio, video, etc.
- **Exercises, tests and test questions development.** According to the overall plan, set exercises, tests and examination questions for each stage. For example, you can set exercises for each section. In Chapter 1, you will set tests, and set mid-term and final exams. You need to use the Excel form for exercises, tests and test questions provided by the platform to enter questions.
- **Audio and video resource development.** The development of audio and video resources mainly includes: ① using mobile phones, computer recording software or special audio acquisition software, such as recording masters to record audio, edit and release audio files; ② Use various animation software to develop two-dimensional animation; ③ Use the screen recorder of the screen recording software to record the PPT explanation and computer operation demonstration to form a video file; ④ Use video capture tools and video capture software to record videos of teachers' explanation of courses, production training environment, and operation process; ⑤ Use video editing tools to clip videos and generate video files; ⑥ Use format conversion tools to convert audio and video formats to meet the requirements of MOOC platform for file formats.
- **Static resource development.** The development of static resources mainly includes: (1) using office software to produce and develop task books and information materials; ② Using office software to develop teaching courseware; ③ Making the course guidance map with mind mapping software; ④ Use image making software to process and make pictures.
- **After completing the course building in the MOOC platform and all resources are ready, the MOOC platform can be selected to upload and review MOOC resources.**



B. Apply MOOC resources to carry out online and offline mixed teaching

To carry out online and offline hybrid teaching, teachers need to make curriculum planning in advance, reasonably divide online and offline teaching content, and make online become effective offline support. Through the organic combination of the two forms of teaching organization, learners' learning can be led from shallow to deep to deep learning. Online and offline hybrid teaching is a new teaching mode integrating information technology and traditional classroom education. It refers to that teachers use the Internet, mobile terminals, cloud computing and other modern information technologies to build online network teaching platforms, and students use online network platforms to complete autonomous learning.

1. There are offline activities that can test, consolidate and transform online knowledge

Through online learning, students can basically master the basic knowledge points. Off the line, after the teacher's inspection and key breakthrough, the rest is to organize students to consolidate and flexibly apply the basic knowledge learned online through carefully designed classroom teaching activities. Let the meeting between teachers and students be used to achieve some more advanced teaching goals, so that students have more opportunities to participate in learning at the cognitive level, rather than paying special attention to whether students sit in the classroom as before.

2. There are resources online, and the construction specification of resources can explain knowledge

Online resources are the premise of hybrid teaching, because the hybrid teaching we advocate is to move forward the traditional classroom teaching through the online form of micro video, give students sufficient learning time, and let every student enter the classroom with a good knowledge base as far as possible, so as to fully guarantee the quality of classroom teaching. In the classroom, our lectures only focus on the key points and difficulties, or the common problems fed back by students during online learning.

3. There is evaluation in the process, online and offline, process and results need to be evaluated

Whether online or offline, students need to be given timely learning feedback. It is an important means to feedback students' learning effects to carry out some online quizzes based on online teaching platforms or other small programs. Through these feedbacks, teaching activities can be more targeted, not only allowing students to learn clearly, but also allowing teachers to teach clearly. Moreover, taking the results of these small tests as an important basis for process evaluation, these test activities will also have the function of learning motivation. In fact, learning should pay attention to both the process and the results. We should even pay more attention to the process. After all, a solid process is the most reliable evaluation basis.

C. Feedback and optimize teaching resources

Through carrying out online and offline mixed teaching in practice, the teaching effect is analyzed and fed back, and

problems in the design are found. And optimize teaching resources on this basis. Including the optimization of MOOC resources and online courses. Each round of teaching can provide valuable experience for the next round of teaching activities. Meanwhile, MOOC resources should be constantly updated and enriched with the development of technology to make it more suitable for learners.

VII. CONCLUSION

Teachers of information science should pay attention to the application of online and offline hybrid teaching mode in teaching, take students as the main body, and give full play to students' subjective initiative. Various methods, such as micro class and cooperative inquiry, are adopted to mobilize students' enthusiasm and make them gradually interested in learning, which can not only promote students to master information technology knowledge, but also exercise their hands-on operation ability. The online and offline hybrid teaching mode has achieved good application effect in practice, which can effectively extend the in class teaching to the extracurricular teaching. At the same time, because MOOC resources are refined, it is more conducive for students to preview and review before and after class, so that students can develop a good habit of independent learning.

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