

Construction and Practice of First-Class Courses for National First-Class Majors

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Abstract: Facing the construction of national first-class majors, aiming at first-class courses, this paper adopts the hybrid teaching mode of combining online and offline to reconstruct the curriculum system of "Signals and Systems". Taking the in-depth correlation research between knowledge points and engineering applications as the main line, a "multi-dimensional collaborative" hybrid teaching system is constructed. Compress the traditional outdated content, increase the basic knowledge points necessary to adapt to the development of modern information science, the cutting-edge technology of electronic information discipline and the case teaching and curriculum ideological and political cases highlighting the principles of engineering application, so as to make the curriculum content reflect the cutting-edge and timeliness; Using the teaching tools and simulation platform of intelligence, the online and offline blended teaching mode is constructed to make the teaching advanced and interactive. The process and diversified assessment methods make the learning results inquiry and personalized. So as to organically integrate knowledge, ability and quality, and cultivate students' comprehensive ability and advanced thinking to solve complex problems.

1. Introduction

Undergraduate education is the fundamental and core task of talent training in Colleges and universities. The cornerstone of undergraduate education is specialty. Building a first-class undergraduate specialty is the foundation and fundamental starting point for revitalizing undergraduate education and connotative development of colleges and universities. In order to accelerate the construction of high-level undergraduate education and improve the quality of talent training, the Ministry of Education officially launched the "Double Ten Thousand Plan" for the construction of first-class undergraduate majors in April 2019 [1]. It is proposed to build 10000 national first-class undergraduate specialty points and 10000 provincial first-class undergraduate specialty points from 2019 to 2021.

Curriculum construction is the core content of specialty construction. The construction of first-class curriculum is an important support for the construction of first-class specialty and the cultivation of first-class talents. "Signals and systems" course is the core professional basic course of electronic information specialty, which plays a connecting role in the teaching plan. The leading course is advanced mathematics, complex variable function and integral transformation, circuit analysis, mastering the basic analysis methods of signals and systems, laying a good foundation for learning follow-up courses, such as digital signal processing and communication principles, and playing an important role in students' postgraduate entrance examination and professional work after employment.

Many domestic teachers and scholars have made a lot of reforms and innovations in the teaching contents, means and methods of "Signals and Systems" course [2-5]. However, in the previous reforms, offline classroom teaching activities are still the main activities, teachers are still in the

main position of teaching, and teaching has low order, which is not conducive to improving students' ability to analyze and solve complex engineering problems and the achievement of quality education. Therefore, it is urgent to introduce new teaching concepts and teaching methods.

Therefore, facing the construction of national first-class majors, aiming at first-class courses, this paper adopts the hybrid teaching mode of combining online and offline, reconstructs the curriculum system of "Signals and Systems", comprehensively reforms the teaching content, teaching methods and assessment and evaluation methods, and creates first-class golden courses.

2. Mixed Teaching Design and Practice of "Multi-dimensional Cooperation"

Facing the construction of national first-class majors and aiming at first-class courses, this paper constructs an online and offline hybrid teaching mode of "Signals and Systems" course on the basis of optimizing teaching contents, reforming teaching methods and improving assessment methods. Adhere to the teaching concept of "student-centered and teacher guided", and explore the teaching reform of "multi-dimensional cooperation" [6] in which the theoretical knowledge in the teaching content is integrated with the ideological and political of the frontier application courses, the traditional and information-based teaching methods are combined, and the knowledge mastery and ability improvement in the evaluation mechanism are connected. The explored multi-dimensional collaborative hybrid teaching system is shown in Figure 1.

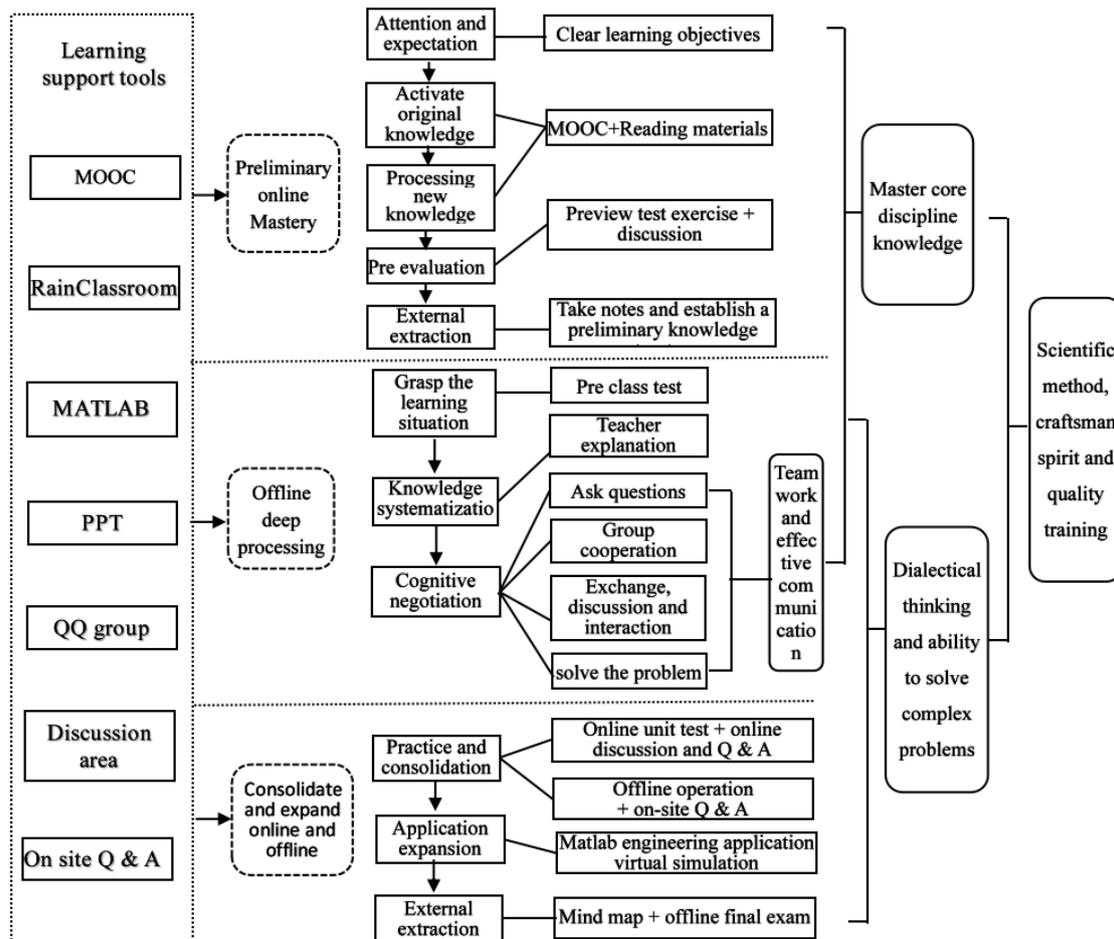


Figure 1 The block diagram of multi-dimensional collaborative hybrid teaching system.

2.1. Reform of Teaching Content

Guided by the curriculum objectives, establish diversified teaching contents and enrich the classroom (basic knowledge, application cases, MATLAB simulation, engineering practice, curriculum thought and politics, etc.). Based on the in-depth correlation research between knowledge points and engineering applications, a new signal and system knowledge system is

constructed. Consolidate the basic knowledge of the course, increase the case teaching of cutting-edge technology of electronic information discipline and highlight the engineering application principle [7], and simulate the engineering practice application with MATLAB [8-10]. Constructing the curriculum ideological and political framework in professional course teaching [11-12]. Stimulate students' learning enthusiasm by introducing cutting-edge technologies of the electronic information industry and the contributions of scientists, cultivate students' ability to comprehensively and deeply analyze and solve problems based on materialist dialectics and rigorous and realistic engineering literacy by rigorous theoretical analysis and engineering application practice, and enhance students' scientific and technological power with the development of China's electronic information industry The sense of mission of patriotism and serving the country.

2.2. Reform of Teaching Mode

With the goal of improving high-level ability, change the teaching organization mode, enrich teaching means, and solve the problems of knowledge fragmentation and weak practical application ability. Explore the online and offline mixed teaching mode to make the teaching run through the whole line from before, during and after class.

- Before class, teachers release preview tasks, and students use online resources for content preview.

- In the class, guided, heuristic and case-based teaching methods are adopted. Teachers talk about fragmented knowledge and integrate the knowledge system. Carry out a variety of teaching activities guided by teachers and led by students. Including the way of flipping the classroom, the teaching method of students' speaking, students' asking, students' answering, students' lecturers' asking and parallel interaction. Use intelligent teaching tools to carry out interactive exchanges such as random questions, bullet screen contributions, in class exercises and group discussions.

- After class, review, answer questions and communicate based on Mu class platform and QQ learning group, and carry out project driven experimental expansion operation. Improve the high-level and challenge of the course, and cultivate students' ability to comprehensively solve problems and innovate by using basic knowledge.

According to students' cognitive law and acceptance characteristics, we should reasonably design mixed teaching methods.

- Online, students learn by themselves before class and preliminarily master the knowledge content.

- Offline, teachers talk in tandem and students turn over the discussion to deeply process knowledge and improve their ability; Low level knowledge is taught online, and key and difficult points are taught offline.

- Online and offline, consolidate and expand through homework, discussion, Q & A, test and simulation. Enable students to gradually deepen from mastering knowledge to improving ability, and then to comprehensively use knowledge to solve complex engineering problems, so as to realize the cultivation of knowledge, ability and quality.

2.3. Reform of Assessment Methods

Guided by students' learning achievements, establish a whole process and multi-form assessment and evaluation method to supervise students to achieve high-level curriculum objectives. Establish an assessment and evaluation model with multiple subjects (teacher evaluation of students and mutual evaluation of students), various forms (homework, discussion, mind mapping, practice, test and examination), and pay attention to process and ability (self-study before class, classroom participation and expansion after class), and implement all-round and whole process assessment. Promote students to internalize knowledge, improve ability and cultivate quality. The composition of the total score of the course includes:

- Usual score (20%): including online video viewing (3%), online homework (8%), online unit test (4%) and offline classroom discussion (5%). It mainly assesses students' learning attitude and the degree of preview, review, understanding and mastery of knowledge points of each class, so as

to ensure students' participation in the teaching process and solve problems in learning in time.

- Midterm examination result (10%): it is an online test to check students' mastery of chapter 1-4 knowledge and help students consolidate their knowledge of each chapter.

- Experimental results (10%): students are required to skillfully use MATLAB tools to independently complete comprehensive design experiments, record, analyze and explain data, and give effective conclusions. Assess students' ability to understand and apply knowledge, and their ability to use modern tools and scientific methods for research.

- Final examination result (60%): to assess the students' overall mastery of the course, basic analysis and calculation ability, and the ability to comprehensively use the learned knowledge to solve complex problems.

3. Conclusion

Facing the national first-class professional construction, this paper takes the first-class curriculum as the goal, takes the "student-centered" educational concept as the guidance, takes the curriculum goal as the guidance, and aims at the "signal and system analysis" curriculum, optimizes the teaching content, reforms the teaching methods and assessment methods, constructs the curriculum ideological and political framework, and reshapes the curriculum teaching system. In the long-term teaching practice, compared with the traditional teaching mode, it has achieved good teaching results.

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