Course Construction of Network Attack and Defense Based on "Four in One" Teaching Mode

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Abstract: Combined with the characteristics of network attack and defense technology course, focusing on the teaching purpose, this paper studies and practices based on the "four in one" teaching mode, and puts forward its own views and experiences.
Keywords: Network attack and defense; Curriculum construction; Practical teaching; "Four in one" teaching mode

1. Introduction

In recent years, with the rise of high-tech industries such as Internet of things, artificial intelligence, cloud computing and big data, human society is entering a new era of interconnection of all things. Both social production and daily life are inseparable from information network, and network security has received unprecedented attention. President Xi Jinping pointed out: "without network security, there will be no national security. Without information, there will be no modernization." in June 2015, the Ministry of Education approved the establishment of a "Cyberspace Security" discipline, which provided favorable conditions for China to train network security personnel. As a core course of Cyberspace Security related majors, network attack and defense course involves the knowledge of computer, communication, mathematics and other disciplines. Its knowledge system is lack of scientific induction and refinement, and the available reference materials are relatively scarce. Therefore, how to organize the teaching content of the network attack and defense course, what kind of teaching materials to choose, how to design the course teaching experiment, and how to ensure that the technology learned in the course can solve the actual network security problems are very worthy of our in-depth research and exploration.

2. The connotation of the four in one teaching mode of "teaching, learning, doing and testing"

The four in one teaching mode of "teaching, learning, doing and examination" is the expansion of Tao Xingzhi's "integration of teaching and doing" theory in the context of modern education. Its basic connotation is to organize, implement and carry out curriculum teaching, practice and assessment activities under the students' autonomous learning mode, and integrate teachers' teaching, students' autonomous learning, practical teaching and assessment. Different from the traditional classroom teaching, it pays attention to the integration and reform of "teaching, learning, doing and testing"[1]. Under the goal of improving students' ability and cultivating core literacy, it realizes the combination of "learning" and "doing", "doing" and "testing" and the connection between "testing" and "learning", and organizes and implements "teaching, learning, doing and testing" through the Internet information platform The whole process of.

3. Challenges in the teaching of network attack and defense course

3.1 The setting of teaching knowledge structure

There is no ready-made case for the setting of knowledge structure of network attack and defense course. It does not have a very mature knowledge system like the traditional computer course. Therefore, during the course construction, the network attack and defense course needs to constantly summarize and accumulate according to the social demand for network security technology, so as to form a curriculum knowledge system suitable for the training plan of the University. Through the investigation and analysis of relevant courses in domestic undergraduate colleges and universities, it is found that the knowledge involved in network attack and defense courses is similar, basically including information collection, password cracking, web security, network deception, log clearing, reverse engineering, social engineering, etc., but the degree of mastering the requirements of knowledge system is very different. Although they are all network attack and defense courses, the course may belong to different semesters of different majors, and its training objectives, leading course settings and teachers are also different[2]. Therefore, there are great differences in the course knowledge structure and class hour arrangement. Jinan University has no Cyberspace Security Specialty at present, but has set up the network security direction under it with the help of the advantages of network engineering specialty. Since 2005, it has successively opened network security courses such as applied cryptography, PKI principle and technology, network security protocol, firewall and intrusion detection, introduction to network attack and defense technology, network information confrontation and so on. Among

them, applied cryptography, PKI principle and technology, network security protocol and other courses mainly organize the course knowledge points from the perspective of Cryptography Application and engineering technology, and organize the teaching process in combination with the actual password application system; Firewall and intrusion detection technology are combined with network planning and design, network management and other courses to set up the knowledge system; For the network attack and defense course with wide span and strong practicality, it is difficult to design reasonable teaching content according to the characteristics of network engineering specialty and the professional accumulation of our university.

3.2 Selection of teaching materials

The choice of teaching materials is an art. Appropriate teaching materials can not only save teachers' energy, but also bring happiness to students. Taking Tsinghua University Press, machinery press, people's post and Telecommunications Press and other publishers as examples, many network security textbooks are published or reprinted every year. There are many names of textbooks, such as computer network security, network information confrontation, network attack and defense technology, etc. from the name alone, these textbooks can basically meet the requirements of course names in different training programs. However, if the content of the textbook is subdivided, it is not always the case[3]. Different textbooks have different emphases. For example, some textbooks focus on protocol analysis, some on Web penetration, and others focus on code analysis, etc. How to select the network attack and defense teaching materials suitable for the network engineering specialty of our university among the many teaching materials and cultivate the network security talents with the characteristics of our university is a problem worthy of study.

4. Implementation strategy of "teaching, learning, doing and testing" four in one teaching mode

4.1 The level of "teaching"

"Teaching" in the four in one teaching mode of "teaching, learning, doing and testing" mainly refers to teachers' theoretical teaching. Its main content is to explain the basic concepts, principles, methods and technologies involved in the curriculum theory. Based on Teachers' "teaching", we can mainly adopt the teaching method, but we can't rely solely on teaching. After theoretical teaching, we should put forward cases, problems and design corresponding situations for students, supplemented by group learning for interaction and communication. Teachers can communicate with students after class through wechat and QQ group[4]. In short, under the four in one teaching mode of "teaching, learning, doing and testing", the mode of "teaching" of teachers has also changed. Teachers need to stimulate students' interest in learning by means of new technical means and interactive communication, which helps to improve students' practical ability.

4.2 The level of "learning"

"Learning" here refers to students' autonomous learning and group learning under the guidance of teachers. In the four in one teaching mode of "teaching, learning, doing and testing", students' "learning" is mainly realized through the following aspects: first, teachers need to gradually promote the teaching process according to the unit during guidance. Through the segmented implementation of the curriculum, specific learning objectives are put forward to facilitate the development of students' autonomous learning and teachers' classified guidance to students. Secondly, the implementation of the four in one teaching mode of "teaching, learning, doing and examination" should pay attention to providing students with the choice of learning methods and ways. Taking single chip microcomputer teaching as an example, because students have different careers after graduation, some tend to program, while most tend to operate and use. Therefore, in course learning, students can make flexible choices according to their future career needs, except that some basic projects require full participation of students. Of course, teachers need necessary guidance and help in the selection process. Finally, we should pay attention to the organization and development of student group learning. With the support of the transformation of teachers' educational concept and the construction of school software and hardware, through the establishment of corresponding mechanisms, group learning is regarded as an important part of students' learning, and clear requirements are put forward.

5. Conclusion

As the core course of network security of network engineering major in Jinan University, network attack and defense course is a compulsory course for network engineering major. After six years of teaching practice, three revisions of syllabus, three improvements of teaching content and three reforms of experimental content, a characteristic course of promoting teaching by competition, promoting learning by competition and combining competition with teaching has been gradually formed. Every year, about 10% ~ 15% of graduates choose network security jobs and enter relevant national departments and network security companies to engage in special network security work. With the continuous increase of network security talents in society, the university is also increasing its investment in the construction of network security specialty. It plans to apply for Cyberspace Security Specialty on the basis of the construction of the original network security curriculum group, set up a richer network security knowledge system, cultivate more network security technical talents and serve the local economic development.

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