# The Exploration on Task-driving Teaching Mode of Network Security Course Reformation and Construction

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*Abstract*—**Analyze the characteristics of network security courses and the use of task-driven teaching practical significance. Discuss the detailes to carry out all aspects of curriculum, including classroom teaching, task-driven experimental procedures, evaluation system of the re-establishment and task-driven implementation of teaching effectiveness.**

***Index Terms*—network security, task-driving teaching, experiment, system**

## I. INTRODUCTION

In the 21st century, computers are connected the Internet, network security has become a network problem of enterprises, universities. In recent years, many companies is on the surge in demand of network security engineers. Network security human resource is needed at an annual increase rate of 14%. In 2011, practitioners in the network security profession will reach the number of 30 million. The demand of market leads to the shortage of qualified persons. In view of this, the domestic colleges and universities take "network security" as a emphasis course, and put it into the computer courses educating system. However, most teaching of this course is on the traditional security theory approach, which means question is always asked first by the teacher, and then give a solution to the problem. Students are passive recipients and imitators. The lack of independent thinking leads the students losing learning initiative [1]. The teaching methods can not match the actual needs of the profession. We all know, the students' enthusiasm comes from their intern's interest and needs. If the task which is designed by teacher is from the students' daily life, interests, hobbies, needs, etc., students will naturally be very interested. Their initiative will be mobilized. In this teaching method, students take the initiative to build knowledge points; teachers are the teaching process' organizers instructors, helpers and facilitators. Teachers guide students to complete the task, and also train their self-learning ability. This is precisely the task-driven teaching mode advocated.

## II. TEACHING MODE RESEARCH

### *A. research Status of domestic and foreign nations*

Task-driven teaching mode is from abroad, which is widespread paid attention to in recent years. In 1979, Prabhu in southern India Bangalore took the task-driven teaching mode which was seemed radical at the time, practice in language teaching. They thought that when the students focus on learning study would be more effective. Jane Willis who monograph "task-driven learning framework" in the 1996 outlined an organization teaching mode. IN his opinion, each task-driven teaching mode has three stages: the stage of task determined, stage of language focus and implementation [2].Because of network security technology developing fast, domestic universities haven't a integral network security courses system. a large number of network security courses are limited on theoretical explanation. Students are lack of practice opportunities and problem-solving abilities. Thus, most universities have not formed a complete theoretical system of network security courses yet. There is no accepted systematic syllabus. This course is still in the early birth. Meanwhile, the network security experiments are very professional, and more entry-level network curriculum theory is needed as a foundation. Students need a lot of practice to gradually master experiments' methods. The task-driven teaching method is suitable for solving this situation. Summarize the experience of teaching network security courses in recent years, task-driven mode is proposed in this topic. Past experience shows us that take solely on classroom teaching; it's hard for students in fully understanding the lectures. And this teaching mode has become an obstacle to students' innovation ability.

### B. Connotation and denotation of task-driven teaching

Task-driven is a teaching method based on constructivist theory. The theory promotes to take students as learning center, emphasize team collaboration. Task requires a specific target point, and new knowledge implicit in one or several representative tasks. Take tasks as the center of learning activities. The knowledge construction can be achieved by task analysis, discussion and completion [3]. Implementation of this theory is diverse, but the purpose is beyond classrooms and textbooks' constraint, and takes the outside world as content and teaching place. Task-driven teaching mode mostly uses case teaching. Task is driven by knowledge point. Teachers focus on students' abilities of identifying and solving problems, independently; training the habit of diligent in thinking and the courage to doubt. Task-driven teaching is a systematic project, including reasonable curriculum goal setting, interactive teaching session, task-driven practices, multi-level evaluation system and other aspects. This is different from the traditional teaching mode, heavy on involvement, light on teaching method; heavy on divergent thinking, light on convergence thinking method; heavy on ability, light on knowledge and memory in teaching evaluation.

### C. The significance of conbining task-driven teaching and network security courses

Network security course is a comprehensive and core course for network engineering major. It is also comprehensive elaboration of the former courses so choose network security and experiment courses as research projects. The main research topic is how to introduce the case on network security class and implement it on network security experiment class. it is concerned hardware connection, working principle, software architecture, operating systems, programming content and other aspects. It requires the students must have strong hands-on ability [4]. Curriculum has so many features, so it is suitable for task-driven teaching. In the "task-driven education", the "task" presented is the most important, that will determine students to take the inactive learn, or passive learn. Firstly, make the task comprehensive so that the students not only learn new knowledge but also review the old knowledge; learn the integrated use of knowledge at the same time. Secondly, we must have a practice; the task must be accomplished through practice. We should avoid the abstract and the complete theory appears in the task; then is attractive for students. Interest is the most important; the task is failure if students are not interested in. so the task which is mentioned must be interesting and attractive for students. At last be innovative, when teachers design tasks, some innovation space should be left to the students, this will be helpful for students' innovation. In short, the proposed tasks to meet the students to understand law, equality of financial education teaching content in an open environment, and guide students to seek knowledge, access to knowledge, the use of knowledge.

Research aimed at improving the quality of teaching, training thinking, technology, innovative ability, study the spirit of good habits, meet social needs of qualified students.

## III. CURRICULUM RESEARCH

The project intends to be carried on in networking engineering department, software school, Dalian University of Technology as undergraduate courses. Take network security course and experiment course as carriers, research in the following aspects, and ultimately complete the project objectives of teaching system:

### A. Task-driven implementation steps of teaching methods

- **Students interest importing**. In the teaching process, allow students to think, observe, enjoy, share and stimulate students' interest in learning and hands-on initiative, to complete specific tasks one by one as a clue to the teaching content of teaching cleverly hidden in each practice task, and these tasks and situations are close to students' life. Guide students in vivid, true "scene" in exploration and practice. Experimental course uses network security advantages of the experimental environment, combined with professional needs; create scenarios by analyzing the examples; make a task into several small tasks could obtain a very good effect.
- **Analyze tasks, looking for a breakthrough. S**tudents' interests are excited and desired. They hope to see the result of task execution through their own hands. That means we must make a timely task. According to the theoretical teaching content, combined with student practice, focusing on the teaching objectives of this big task, the teacher shows examples, and then with the students analyzing small task containing learned knowledge and new knowledge. Promote each level, and ultimately complete all teaching objectives of small tasks. So students gradually learn new knowledge and skills. Totally, teachers focus on the task, the task is decomposed. Students are guided to explore problem-solving methods, procedures, analysis skills, known and unknown skills, and the initial design to complete the task.
- **Students practice, teachers guide.** When students try to practice the difficult task, they can adopt flexible and diversified ways to solve it. The task can be completed independently. Students can exchange experience and cooperate with each other. Some students also can provide operational schematic step by step. Questions raised by teachers, encouraging students to active learning through independent exploration and the state collaborate with each other to carry out exploration activities, complete the issues and the application of knowledge and meaning construction. Teachers as collaborators guide the students to explore the key steps and the focal point of guidance, coaching. Students should master the state of the task, while guiding students to discover and creatively solve new problems, help students complete the exploration task. During the experiment, allow the quick operator students guide the unskilled students. Take interaction among the students. the experimental teachers should also strengthen the tour guide, discover the problems of students, organize students to experiment.
- **Demonstrate experiments' results.** Teachers should guide students to focus on tasks, trying to practice their

own way to complete the task. Introduced the experience to everyone. Meanwhile, the teachers through explanation, demonstrations, slide show, etc. targeted to guide students to learn and implement the method of task decomposition, skills, and identify the key tasks and difficult task. Some easy task to make mistakes in the experiment where Tell some small skills or students, let them experiment. understand the relevant knowledge and skills. At the same time by showing good work of teachers, innovative work to recognize student achievement, students in the "accomplishment" in the end of the task, and for different levels students, carry out the task to expand, reflecting the individualized, hierarchical teaching. To better understand the mission-driven teaching methods, see table Ⅰ "Task case".

TABLE I. TASK CASE

| *Teaching* | *Teaching objectives* | *Teacher activities* | *Student activities* |
|---|---|---|---|
| ***Show task*** | Clear the goal of class | Demonstrate case | Clear objectives of case |
| ***Analysis task*** | Students'abilities of analyzing and solving problems | Teacher guide students to analyze the task, teacher summarize | Thinking and answer |
| ***Exercise task*** | Master the method and skills | Guide and record | Self learning and finish other exercise |

- Course performance assessment methods. Student achievement results from the usual results, test results, project results and final examination 4 parts. ①project results is 40% of the total score, performance evaluated by the teacher assessment, student self-assessment, student peer assessment component; ②usual results include answering questions enthusiasm, classroom and online questions is of the total score of 10%; ③ test results for 10% of the total score, the use of the network presented in a way, the answer is exactly the premise, complete with different speeds according to different scores; ④ final exam is 40% of the total score. Through such a performance evaluation method of multiple targets, from the system-oriented aspects of requiring teachers to pay more attention to improving the quality of teaching, and research projects to guide students to pay more attention and practical problem-solving ability.

*B. completion of the course system, teaching resources, build three-dimensional platform.Task-driven implementati on steps of teaching methods*

Task-driven curriculum system construction is to build an important symbol of a complete set of teaching resources, including a summary of teaching experience, teaching papers published; organize data on previous teaching complement theoretical induction and sublimation, forming an experiment handout; The establishment of teaching the course website to facilitate the angles between the teachers and students to communicate and share resources; improve the production of multimedia courseware content, thematic teaching can incorporate the students, expanding the breadth of knowledge for students to do follow-up reference.

## IV. IMPLEMENTATION

Network security course is taught to undergraduate undergraduates from 2005 in Dalian University of Technology. Research has gradually introduced the idea of teaching, training effect from the students and curriculum theory. And experience to complete some work areas, which include: network and information security programs and network security, multimedia courseware content development on the machine. See figure 1 "Task-driven network security courses implementation plan"

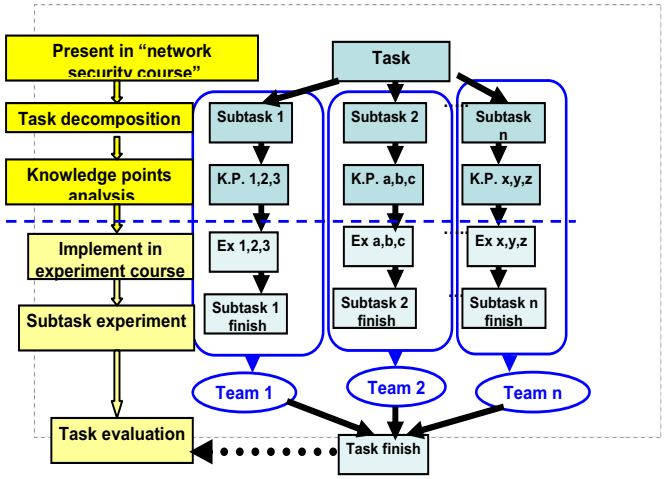


Figure 1. Task-driven network security courses' implementation plan

In addition, according to the research on domestic and international network security courses and enterprise network security professionals needed, formulate a practical attack and defensive network security laboratory. Write a corresponding experimental handout; and publish several articles based on previous teaching experience. Students' current employment situation has a significant advantage.

## V. CONCLUSION

The project goal is to introduce courses in network security task-driven teaching ideas to enhance the quality of the course. And strive to build advanced and complete university education system, which consistent with the needs of students' development and market. Weaken the classroom knowledge taught; enhance the proportion of the tasks' tacit knowledge transfer, train habits of creative thinking and innovation; establish and develop task-driven teaching mode. Teachers complete the role reversal from the teaching knowledge into task guider and inspirer who promote interactive, task-driven teaching methods to reduce the explicit knowledge of classroom indoctrination; students participate into the

curriculum point of view, and enhance learning motivation, promote research based learning mode. Blurred the boundaries of teaching and learning, promote equality of research between teachers and students. Improve their self-learning ability, independent thinking and research ability, creativity, communication and team collaboration capabilities. The purpose of training the community integrated human resources. Lay the scientific research foundation for students in the future.

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