

# Research on New Practice Teaching Mode of SPC Switching Fundamentals Course Based on the Training Platform

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According to the need of curriculum construction, and combined with “C&C08 SPC Switching Comprehensive Experimental Platform”, a new mode of practice teaching innovation and exploration for the foundation course SPC Switching Fundamentals had been presented. Through reforming, students’ comprehensive practical ability was improved, comprehensive quality education was really carried out in the course of teaching, and adaptability to the need of the society had been enhanced. The practice teaching innovation plays positive exemplary role for practice innovation and construction of similar undergraduate course.

*Keywords:* SPC Switching Fundamentals; Teaching Innovation; Practice Education

## Introduction

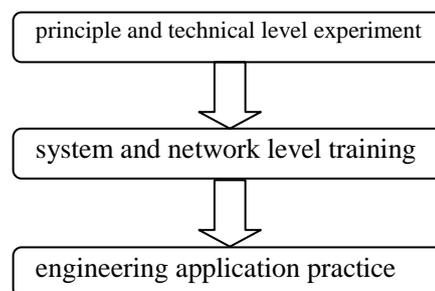
Communication industry plays a very important role in the national economy, and it’s one of the important industries which are developed and supported in China. As the basic professional knowledge, “Switching principle” is widely used in the field of communication engineering, and has become one of the central curriculums for communication specialty teaching in various higher education institutions. The purpose of this course is to make students master the basic idea and principle of switching technology. HUAWEI “C&C08 SPC Switching Integrated Experimental Platform” was introduced and the Communication Switching Experiment Center was founded in our school, which provided great support for experimental teaching of this course. In recent years, a series of reformation was implemented in our experimental teaching of SPC Switching Fundamentals Course, and good effect was obtained.

## New Practice Teaching Mode Based on Practical Training Platform

Theory and experimental teaching can not be separated from each other. But no appropriate experiments were carried out initially because of the limitation of experimental condition, which didn’t accord with the characteristics of this course. Therefore we purchased the “Program-controlled Switching Experiment Equipment” produced by ZHONGYOU Science and Technology Inc. WUHAN, and some demonstration experiments are presented. Later, in order to improve the experiment teaching further, some experiments for our course were carried out by using EDA, DSP experimental platform and Communication Principle experimental equipment, which included PCM coding and decoding, speech signal generation, HDB3 codes conversion and DTMF transceiver experiments etc. The simulation experiment of time slots interchange principle was also implemented based on Simulink software package in Matlab to make up the deficiency of the experimental teaching for the course.

Communication Engineering Specialty became “Provincial Characteristic Specialty” of Hebei Province in 2007. Afterwards HUAWEI “C&C08 Program-controlled Exchange Integrated Experimental Platform” was introduced and the Communication Exchange Experiment Center was founded for the construction of this course. On this platform, the miniature of telecommunication network can be constructed. All these provided the opportunity for the development of this course. We carried out various experiment teaching reformation for SPC Switching Fundamentals Course and established a novel comprehensive curriculum practice teaching system which included three levels. They are “principle and technical level experiment”, “system and network level training” and “engineering application practice”, which is shown in **Figure 1**.

In this system, large commercial equipment network was used as students’ practical training platform in “principle and technical level experiment” and “system and network level training”. In “engineering application practice” level, students can contact and deeply understand the production process of professional equipment and relevant technology standard in off-campus practice training bases. Our practical teaching system provided the process of demonstration, testing, design and experience for switching technology. The experimental teaching reformation was divided into three steps.



**Figure 1.**  
Three levels of curriculum practice system.

Firstly, combining C&C08 Program-controlled Switching Comprehensive Experiment Platform and the actual teaching situation, relevant experiments were carried out. Through practical teaching, students can master the operation principle of communication chips and their typical application circuits. Contacting the content in classroom teaching, such as switching system interface circuits and their function, switching network and control system, they can learn how to design practical interface circuit, switching network and control system, and understand the basic idea and method of software design.

Secondly, we made full use of the existing experimental conditions, explored experimental teaching innovation, developed integrated experiment and encouraged students to design experiments by themselves. Through guidance of the complete working process of Chinese Telecom Telephone Switching Network, using real work as media to design teaching, the project-based curriculum content system was established. For a given task, students experience the planning and design process completely, such as plan selection, experimental procedure's determination, selection of experimental apparatus and method, the experimental analysis and summary report. It can fully cultivate students' theoretical knowledge and comprehensive application ability, improve their experimental skills, inspire their enthusiasm, and make effective practical training.

Thirdly, we made good use of graduation practical training, graduation design project, experimental equipment and off-campus practice bases to cultivate students' practice ability. Students can understand the digital switching system completely, design switching software skillfully according to requirement of telecommunication business, and will be competent for the future work in telecommunications industry.

At the same time, we edited the experimental manual according to teaching practice. Therefore, students can grasp the learning contents, practice professional knowledge and skills thoroughly. In subsequent courses, teachers gave good evaluation on students' learning and practical ability. Their competitive ability in employment was increased and the period of adaptation in future work was shortened.

## Various Practical Teaching Methods

Teaching method is the key factor to improve the teaching effect. Combining with the characteristics of this course, we adopted the following typical teaching methods according to different contents and stages in practice teaching.

### Demonstration Teaching Method

Because the telecommunications switching equipment is valuable and complex, students must master the correct operation steps. Thus the teachers' demonstration operation is very important. Through demonstration students can understand the training targets, operation rules, regulations and safety requirements when they operate independently, and grasp the professional quality gradually.

### Project Driven Teaching Method

We use "project teaching method" in "task driving" methods in practice teaching. Every project process was implemented according to the circular process as planning, confirming task, demonstration, training, assessment, checking and trouble-

shooting, summarization and improvement. Students' theoretical and practical application ability raised dramatically through learning theory, practical operation and integrated project design.

### Case Teaching Method

According to the strong application background of this course, teachers can provide actual engineering case, present questions, and organize students to analyze and discuss. In this process, students work independently, and teachers guide beside. Through case teaching method, students' ability of analyzing and solving practical problems can be improved.

### Scenario Teaching Method

During teaching process, the switching operation process in various work situations was simulated. Students can get familiar with the operation and maintenance work flow in switch equipment. Through creating telecommunication business scenarios and working process, students can understand and master the relative knowledge in telecommunication switching technology.

## Effects in Reformation Practice

Excellent achievements were obtained in teaching system reformation of this course. We built a complete practice environment which included principle, technology and processes, switch structure, data configuration, signal process, signal test and analysis through telecommunication switching platform. The enterprise application and business requirements were also introduced in teaching. In late teaching, students can study actual operation of commercial equipment through cooperating with enterprise.

Then the knowledge can be applied in the actual work environment through network construction, data and business configuration. By cooperating with XUNFANG Cop. and HUAWEI Cop. of Hebei Province, the experimental conditions were promoted and the teaching system and content were synchronized with actual technical development. Through the development of teacher training, off-campus internship and other means, the combination of theory and engineering practice are enhanced further. Students' employment competitiveness was increased, and adaptation period in future work are shortened through training. In recent years, the employment feedback from China Netcom, China Mobile and China Telecom Cop. indicated that our students have a good foundation of switching theory and adaptive ability for actual work.

## Conclusion

Excellent achievements were obtained in reformation of SPC Switching Fundamental Course Practice Teaching in our school. The comprehensive practical ability of students was improved, in the course of teaching the students' comprehensive quality education was carried out really, the students' adaptability to the need of the society had been enhanced. It provides a new road for undergraduate curriculum reformation and construction. The practice teaching innovation plays positive exemplary role for practice innovation and construction of similar undergraduate course.

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