# Research and Practice on Cognitive Practice of Electronic and Information Engineering

## Li-xin SHI* and Hou-jie LI

College of Information and Communication Engineering, Dalian Nationalities University, 116600, China

*Corresponding author

**Keywords:** Cognitive practice, Cognitive education, Practice form.

**Abstract.** The problems on cognitive practice of electronic and information engineering are analyzed in this paper. After several years of attempt and demonstration, the teaching goals of cognitive practice are ascertained, which are academic guidance, professional education and innovative consciousness training. The practice forms are enriched, such as visit and lecture. From the specialty acceptance, the enthusiasm of learning and the adaptability of graduate, cognitive practice achieved good results.

## Introduction

Cognitive practice is a concentrative practical teaching of electronic and information engineering, is an important part of talent training program. Cognitive practice helps student to enhance perceptual knowledge of specialty, industry and profession, to establish correct professional consciousness and moral, to understand training program, to learn specialized courses [1-3]. The curriculum setting, teaching goal and implementation of cognitive practice in different schools are different. In this paper, we discuss how to realize the teaching goal of cognitive practice more effectively.

## Cognitive Practice Problems

### Insufficient Attention

During investigating, we find that a large number of electronic and information engineering did not offer cognitive practice course. The cognitive practice is integrated into specialty education in some specialties, where the general situation of school and specialty are introduced, discipline status, social role and development trend are introduced, training program is introduced too. Since students have just entered school, knowing nothing about specialized courses, they can't really understand the training program, graduation requirements and curriculum system. Specialty education does not play an effective role in guiding students to follow up specialized courses. The cognitive practice is also merged into production practice in some specialties, where the students' production skills or management capabilities are trained, job specifications and professional ethics are trained too. Since students have learned a lot of professional knowledge and skill, production practice can achieve good results. But in the first two years, students don't understand specialty, industry and profession well, are in the passive and blind state of learning.

### Single Practice Form

Visiting modern electronic enterprises and research institutions can broaden students' horizon, can help students understand the production flows, production technology and technical standards, can help students understand the industry standards and norms, electronic engineer professional norms. It is undeniable that visit is still the main form of cognitive practice, but cognitive practice can't reach all the teaching goals simply relying on the visit. On the one hand, teachers need to communicate with business mentors sufficiently, arrange the content of visit and interpretation. Otherwise, visit turns

into wandering easily, can't achieve expected results. On the other hand, visiting enterprises can't help students to understand specialty, and can't guide students to select and learn specialized courses. Therefore, it is necessary to adopt different practice methods according to the teaching goals of cognitive practice.

### Ascertaining Teaching Goals

Specialty cognitive education consists of specialty education, cognitive practice, production practice. These teaching links connect each other, supplement each other, and strengthen gradually [4]. Through cognitive practice, the following teaching goals will be achieved:

### Understanding Training Programs, Graduation Requirements and Curriculum System Further

Cognitive practice is arranged in the sophomore year, before production practice and after specialty education. After more than one year of learning, students have learned three or four specialized basic courses, have understood specialty clearly, and are faced with the choice of specialized direction and specialty elective courses, are urgent to deeply understand the training program, graduation requirements and curriculum system. Through cognitive practice, students can understand the professional knowledge and its application in industry, can understand the actual operation of a job. Through cognitive practice, students' professional awareness is enhanced, enthusiasm of learning professional knowledge is roused.

### Understanding Production Flow and Project Management Flow Preliminarily, Understand Professional Ethics and Norms of Electronic Engineer

Through cognitive practice, students recognize enterprise, industry and profession preliminarily, establish correct professional consciousness and moral, find out professional quality and skill of electronic engineer, improve specialty identity of electronic information engineering. Since professional ethics and norms of electronic engineer should be developed for a long time, sooner rather than later.

### Rousing Enthusiasm for Electronic Products or Systems, Training Preliminary Innovation Consciousness

During cognitive practice, students contact with modern enterprises for the first time, contact with the outstanding works of teachers and seniors for the first time, their enthusiasm of development and creation is roused naturally. Through innovative lecture, innovation consciousness is inspired, innovation ability is trained, which will be twice the result with half the effort. After cognitive practice, there are electronic technique practice, single-chip computer practice, software development practice, production practice and synthetic specialized practice, where students will design and produce their works with better innovative consciousness and stronger innovation ability.

### Enriching Practice Forms

According to graduation requirements of training program and syllabus of cognitive practice, the cognitive practice is carried out through visiting students' work, specialized direction lecture, visiting electronic enterprise, inviting industry experts, innovative lecture [5,6].

### Visiting Students' Work

There is different concentrative practice at each term, where students design and complete their works, including some high-quality works, such as tracking and obstacle avoidance vehicle, biped racing robot and other works. Meanwhile, students actively participate in various competitions in the country, provinces and cities, create many outstanding works, achieve excellent results. These senior students rely on the professional knowledge, start from real life, design novel and practical works.

These works deeply attract the attention of students, stimulate students' interest, arouse students' learning and creative desire.

## Specialized Direction Lecture

There are three specialized direction in electronic and information engineering of dalian nationalities university, which are application electronic technology, software development technology and information processing technology, whose application area, curriculum system and talents cultivation are different. Three persons in charge introduce their research content, application areas, curriculum system during cognitive practice. Students will choose their own direction according to interests and hobbies in the third years.

**Application Electronic Technology Direction.** Application electronic technology orient to modern electronic technology industry, meet the requirements of electronic products and equipment production, service and management, train highly skilled professionals with professional knowledge and application ability. It is widely used in the field of smart home, cultural entertainment, network communication, aerospace and other fields. The person in charge of this direction takes motor control system as an example to introduce analog electronic technology, digital electronic technology and other courses.

**Information Processing Technology Direction.** Information processing technology is a modern science and technology, which involves information acquisition, processing, communication, is the focus of the world's scientific and technological development, is also the focus of national science and technology development strategy. It includes modern detection and measurement technology, voice and image processing technology, pattern recognition and artificial intelligence. It is widely used in the field of automotive electronics, biomedical engineering, consumer electronics, economic and military fields. The person in charge of this direction takes portable ECG data acquisition and analysis system as an example to introduce signal and system, digital signal processing and other courses.

**Software Development Technology Direction.** According to the needs of society and the interest of students, software development technology direction is set up. Combined with the characteristics of specialty, this direction focuses on embedded software development, web software development, app mobile software development, involves senior program design, data structure and other courses.

## Visiting Electronic Enterprise

Visiting electronic enterprises is an important part of cognitive practice. In order to avoid a mere formality, enterprise tutor teaching and workshop visits are arranged during cognitive practice. Enterprise tutor introduces enterprise culture, production process, relevant industry standards and norms, and professional ethics and norms of electronic engineer, explains production process, equipment, technical standards and post specifications of electronic process such as SMT, assembly and so on. Students understand employment, engineering tasks and capacity requirements through visiting enterprises.

## Inviting Industry Experts

In addition to visiting the electronic enterprises, industry experts are invited to introduce electronic engineering project management. Through experts' explaining, students understand project bidding, production and procurement, installation and commissioning, acceptance and settlement, guarantee and after-sale service, understand preliminarily project management process and decision-making methods.

## Innovative Lecture

Innovation is the driving force to promote the progress of history, science and technology innovation is the means of competition between countries. Development of innovation consciousness and training of innovation ability are the important aspects of college teaching. Visiting the outstanding works of teachers and students will inevitably stimulate students' enthusiasm and creative impulse.

Many creative thinking methods such as reverse thinking, lateral thinking, analogical thinking and associative thinking are introduced systematically during cognitive practice. Students understand that imagination is the foundation, knowledge is the necessary premise and inspiration is the sublimation of creative thinking.

**Conclusion**

Cognitive practice is an important teaching link for electronic and information engineering students to enhance their perceptual knowledge of specialty, electronic industry and engineering profession. After several years of attempts and demonstration in our school, the teaching goals of cognitive practice are ascertained, which are understanding specialty training program, graduation requirements and curriculum system, understanding electronic enterprise production flow, project management flow, understanding professional ethics and norms of electronic engineer, training preliminary innovation consciousness. Cognitive practice is carried out through visiting students' work, specialized direction lecture, visiting electronic enterprise, inviting industry experts, innovative lecture. From the specialty acceptance, the enthusiasm of learning and the adaptability of graduation, our cognitive practice achieved good results.

**References**

[1] Bo Su, Li Wang, Ai-hua Dong. The Research and Practice on Practice Education of Electronic and Information Engineering Specialty. China Modern Educational Equipment, 2010, (9):144-146.

[2] Yong-fang Zhang, Li-fang Shen, Kai-lian Deng, et al. Reform and Exploration on the Cognition Practice Teaching in Electronic Information Engineering. Experiment Science and Technology, 2014, (5):91-94.

[3] Chun-yan Li, Yan-qing Cong, Pei-de Sun. Analysis and Exploration on the Teaching Process of Cognitive Practice Based on the Improvement of Students' Specialty Identity. Science & Technology Information, 2014, (8):26-27.

[4] Xiang-zhou Sun, Tie-jun Chen, Ying-man Huang. Analysis of College Professional Cognitive Education from the Perspective of Modern Education. Education and Vocation2013, (8):167-168.

[5] Fu-wei Wang, Yang Gao, Mao-qiang Li, et al. New Strategy and Practice on Specialty Cognitive Practice. Theory and Practice of Contemporary Education, 2016, (9):91-93.

[6] Fang-cai Mao. On the Promotion of College Students' Professional Cognitive Ability. Higher Education Forum, 2012, (9):82-85.