The Construction of Electronic and Information Specialty Course Based on the Application of Personnel Training: a Case Study of Communication Principle Course

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Abstract: As an experimental unit of college in its transition, the college of electronic information is on the way, as an experimental unit of profession, the electronic information is on its way as well, cultivating the engineering applied talents is the final goal of transformation development. This paper presents a series of measures for the course construction of electronic information specialty in the course of communication theory, which lays a foundation for the transformation and development of electronic information specialty in our college.

Keywords: Application-oriented; Electronic information; Course construction; Reform in education; Cultivation of talents

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1. Introduction

The College of electronic information is a pilot college for the transformation and development of Huanggang Normal University, with the aim of training applied engineering talents. Communication principle is an important basic course for electronic and information majors. It mainly introduces the composition and per-

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formance analysis of analog communication system and digital communication system, the basic theory and method of communication signal analysis, digital process and transmission, system coding and so on. As a basic course in the field of communication, it plays a very important role in the architecture of electronic and information courses, and is the basis of the following courses in the field of communication, such as Fiber-optic communication, etc., at the same time, it is also a compulsory subject for the master’s examination of electronic information specialty. As a course with strong principle, communication principle has the characteristics of strong theory, abstract concept, more knowledge points and more analysis based on mathematical model. This requires that students should have a good mathematical foundation, a good abstract thinking. As a local undergraduate university electronic information students, in these aspects are at a disadvantage. Therefore, after years of teaching and research, the author found that our electronic information students find it difficult to learn, and that the combination of theory and practice is not enough, so from the student level is not valued. Therefore, how to improve the teaching quality, improve the teaching effect and raise the students’ interest in the course of communication principles, cultivating students’ ability to analyze and solve practical problems is the content we must solve in the course teaching reform.

2. The Present Teaching Situation of the Course of Communication Principle

As a basic course of communication, communication principle requires students to master the basic principles and applications of various communication technologies. At present, the total duration of the course “communication principle” is 64, including 48 theoretical and 16 practical hours. The teaching material is “communication principle” (6th edition), edited by Prof. Fan Changxin and published by National Defense Industry Press. The main contents include channel model, signal modulation and spectrum analysis, digital baseband and band-pass transmission system analysis and orthogonal coding. Classroom teaching mainly adopts the traditional teaching mode of teacher-centered teacher speaking and students listening. The practical teaching link mainly uses the format experiment box purchased from the company to do some experiments, most of these experiments are confirmatory, and students simply need to build a circuit to connect it. These have seriously hindered the students’ divergent thinking ability and practical ability training. Generally speaking, the following problems exist in the teaching of the course of communication principle in our college: (1) the teaching mode is single and the teaching method is old; (2) the teaching content is not updated in time and
is not closely related to the industrial enterprises; (3) the practical teaching content is old, the equipment is single and backward; (4) it is not close enough to the curriculum; (5) the construction of teaching team is not enough, the “double-qualified” teachers are not enough, and the teaching and research are not enough.

3. The Construction Goal of Pommunication Principle Course

This course construction reform is based on our university as a local undergraduate university transformation development and our institute as a transformation development pilot department, with the aim of training engineering application-oriented talents, the engineering practice ability of students is the embodiment of the core competitiveness of the university. Therefore, the educational and teaching activities should aim at cultivating and strengthening students’ innovative ability and engineering practice ability. So should the teaching reform of the course of communication principles. It is necessary to integrate and refine the curriculum standards of communication principles with the background of the transformation and development and the enterprise standards of related industries:

(1) **Knowledge goals**

1) to master the basic concepts, principles and methods of analog and digital communication theory;

2) to be able to model, qualitatively analyze and quantitatively calculate a simple communication system;

3) to be able to debug a given communication circuit;

4) the problems in the experiment process can be analyzed and eliminated;

5) a certain innovative ability to the prescribed task.

(2) **Quality goal**

1) according to the needs of the task, using a variety of tools, media to collect information, and can filter useful information for the task;

2) able to formulate work plans and carry out work in a step-by-step manner according to the requirements of the tasks;

3) able to analyze problems and propose different solutions;

4) can take the initiative to learn new knowledge, new technology, and can be selectively applied to the work.
(3) **Capability goal**

1) good language skills, able to express their thoughts, attitudes and ideas in an orderly manner;

2) a team player, able to work in a team manner and coordinate their work with the previous and subsequent processes; able to take the initiative to cooperate with others, participate in team work, communicate and negotiate with others, and have good interpersonal relationships;

3) the ability to adapt to the corporate environment, integrate into the corporate culture, with strict discipline and enough loyalty to the enterprise;

4) product quality awareness, work responsibility, a good sense of social responsibility.

4. **The Measures of the Course Construction of Communication Principle**

   **(1) Reform the teaching mode and change the teaching method**

   In terms of teaching mode, we combine the latest achievement of international engineering education reform in recent years —— Foshan CDIO engineering education mode to implement teaching. It stands for Concept, Design, Implement and Operate. It takes the life cycle from product development to product operation as the carrier, and enables students to learn engineering in an active, practical and organic way. CDIO training program divides engineering graduates’ abilities into four levels: engineering basic knowledge, individual ability, interpersonal team ability and engineering system ability, the syllabus calls for an integrated approach to the training of students at these four levels to achieve the intended goals. In the teaching process of the communication principle course, we should deal with the relationship between teaching basic theoretical knowledge, stimulating students’ learning interest and cultivating students’ innovative ability, the teaching method should change from the traditional indoctrination to the guidance and Heuristic, the exploration and the active study, so that the teacher’s teaching should change from “teaching-oriented” to “learning-oriented”, and the students’ learning should change from “want me to learn” to “I want to learn”, give full play to students’ subjective initiative and arouse their learning enthusiasm.
(2) **Integration of teaching content and docking with industrial enterprises**

According to the CDIO teaching model, students must become active participants in the whole college life and teaching, and teachers are the facilitators of student activities. Therefore, we should change the “one-man” teaching method, which used to teach theoretical knowledge first and then carry out experimental teaching to verify it, and combine theoretical knowledge teaching with practical operation, etc., let students listen to learn, learn to do, do to ask, ask to think, think to get. The teaching of communication principle should start from the integration of teaching contents, and be fully conceived and designed systematically. In order to strengthen students’ understanding and mastery of the methods of basic principles, we can make classroom teaching go into the laboratory, or “move” the laboratory into the classroom, and make use of integrated teaching to integrate the teaching contents into the operation practice, forming the teaching process of “knowledge leading into Florida--An analysis of the theory of Florida--consolidating, summarizing and improving”.

(3) **To reform practical teaching and increase the cultivation of creative ability**

The course of communication principle is theoretical, and students’ understanding of each knowledge point must be strengthened through practice. In the past, all the experimental projects were based on the communication principle laboratory box produced by a company. The Experiment Circuit uses the whole board type design, when the student does the experiment, only needs the simple connection part circuit to be possible to carry on the test. This has seriously hindered the cultivation of students’ divergent thinking and innovative ability. With the development of computer simulation technology, simulation software such as Matlab, SystemView and LabView can be introduced into the course of communication theory experiment. In the experiment content we should carry on the design, may design the experiment content by the Engineering Project Way, through the engineering project teaching to launch. First, the basic experimental verification of the principle knowledge is carried out, then the design simulation is carried out through the simulation software such as Systemview, and finally the circuit modules are made through the PCB design, after each module circuit is understood, all module circuits are integrated to form a complete communication system for comprehensive testing.
(4) Constructing the basic curriculum system of electronic information specialty and strengthening the construction of curriculum group

As a local university, our university is located in the application-oriented undergraduate, cultivating the engineering-oriented talents with certain theoretical level and innovative ability to meet the needs of local economic construction. The specialty of electronic information is characterized by rapid development of technology and rapid renewal. Therefore, the basic courses of electronic information major play a very important role in the cultivation of talents and the knowledge structure of students, the construction of the same kind of courses which are closely related to each other, have strong internal logicality and belong to the same category of cultivating ability is regarded as a group of courses. The courses include circuit principle, signal and system, electronic technology, High Frequency Circuit, communication principle, digital signal processing and so on. As a pilot specialty of transformation and development, we should integrate the teaching contents and Resources of the course group with the aim of cultivating the engineering applied talents, and construct a scientific and novel knowledge structure and course system. Through the overall construction and reform of the curriculum group, the internal connection of the curriculum knowledge in the group is thoroughly studied on this platform, and the knowledge points of each course are sorted out and refined, so as to open up the gap between the courses and avoid repetition and omission, in order to achieve the integration of professional teaching.

(5) Reforming the teaching staff and strengthening the building of “double-qualified” staff

In the specialty construction, the teacher troop construction is particularly important. In our college, the age structure of the teaching staff of the Electronic Information Specialty is quite reasonable, with the majority of young and middle-aged teachers; in the academic structure, most of the teachers have master’s degrees or above, and there are only two professors with professional titles, and not many associate professors, the majority of teachers have the title of lecturer. In addition, there are few “double-qualified” teachers who have rich experience in engineering practice. Most of the teachers have been teaching in colleges and universities since their graduation. These and we are in the undergraduate professional development of the transformation and training of engineering talent is not appropriate. Therefore, we should reform the teaching staff and strengthen the construction of “double-qualified” teaching staff. Young teachers make up the majority of our teaching staff, the theoretical foundation of young teachers can be strengthened through visits to schools, such as the “rainbow” training program, which is held
with schools such as the Central China Normal University and the Wuhan University, at the same time, young teachers will be encouraged to train in enterprises to improve their practical experience in engineering, and scientific research teams will be set up by bringing in “Huangzhou scholars” and other foreign countries. Senior professors will lead young teachers to carry out scientific research and enhance their scientific research capabilities, promotion to senior position as soon as possible. This series of measures can effectively improve the structure of our college electronic information professional teachers.

5. Closing Remarks

Taking the teaching reform of the course of communication principle as an example, this paper puts forward a series of reform ideas and methods for the construction of electronic and information specialty in our college. In the next step, the author will make further research and work together with team members to further improve the implementation of the specific program in all aspects, and strive to make electronic information specialty into a brand college in the process of transformation and development.

Works Cited

[1] Li Jikai. “The construction and reform of the Basic Courses Group of electronic and information specialty in newly-built undergraduate universities”. China Electric Power Education, 2014,23:98-99.

[2] Wu Lili, Yuan Chao, Li Bo. “Exploration and research on teaching reform of Communication Principle”. Jiangxi Agricultural Journal, 2010,224:194-97.

[3] Tao Jie et al. . “Reflections on the course construction of Communication Principles”. Science and education, 2014,266:61-62.

[4] Zhu Xiangqing, et Al.. “Research and exploration on project-based practical teaching of communication principles course”. Journal of Jiaying University, 2014,32(12): 84-88.

[5] Wan Haibin. “Taking the teaching of communication principle as an example”. Coastal Enterprises and Technology, 2013,154(3): 36-38.

[6] Yang Jie. “The reform and exploration of the practical teaching system of communication principle course”. China Modern Education Equipment, 2015,217(5): 67-70.

[7] He Peng. “Research on the teaching methods of communication principles for undergraduates under the background of Innovative Entrepreneurship Education”.

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China Modern Educational Equipment, 2012,285(27): 69-70.

[8] Xu Hong. “Problem-based heuristic teaching for the course “principles of Communication”. Journal of Electrical and Electronics, 2015,37(2): 67-69.

[9] Zhu Jun. “Research on the teaching reform of the course “communication principle” under the Information Background”. Journal of Hubei Radio and Television University, 2015,35(4): 30-33.

[10] Yang Shen. “Discussion on the teaching of the course of communication principles based on Simulink”. Science and Education Guide, 2013,27:96-97.