Advances in Social Science, Education and Humanities Research (ASSEHR), volume 95
2017 International Conference on Education, Economics and Management Research (ICEEMR 2017)

Research of Communication Principle Course Teaching

—The course teaching research of communication principles in the profession of electronic information engineering

Faquan Yang
Electronic and Information Engineering
Foshan University
Foshan, China
Yafaquan.fosu@163.com

Ling Yang
Electronic and Information Engineering
Xinhua College of Sun Yat-sen University
Guangzhou, China
Llingyang2015@163.com

Yun Fan
Electronic and Information Engineering
Foshan University
Foshan, China
Fanyun@163.com

Lijun Feng
Electronic and Information Engineering
Foshan University
Foshan, China
Lijun @163.com

***Abstract*—The communication principle is an important course of electronic information speciality expeically for electronic information engineering and communication engineering. It is the theoretical basis of the follow-up professional courses, and its teaching quality directly affects a lot of professional courses of study. How to learn communication principle course can improve the quality of teaching is worth exploring. In this paper, the teaching method includes the experiment of the course which has been carried on the exploration and the relative summary combines with the teaching practice.**

Keywords—communication principle; teaching method, teaching experiment; update of teaching

I. INTRODUCTION

The content of communication principle course is wide, abstract, complex and systemic so the students generally feel the course is difficult to learn while the teachers also say it is not easy to teach. With the rapid development of electronic information industry and communication, technology is enhanced increasingly, and using the traditional teaching methods to carry out the communication principle course teaching cannot meet the needs of students in adapting the electronic information industry. In order to make students easier to learn the courses, apply the communication principle and improve the student the practical ability, application ability, innovation ability, course teaching reform are imperative. Especially on the basis of the new talents cultivation plan, how to improve the teaching quality of communication principle is a main topic explored by the related teachers from each university. Therefore, this paper argues how to renew the teaching idea, improve the teaching method, choose the right teaching content, and reform the experiment teaching etc. In order to improve the teaching quality of communication principle for adapting to the development of modern communication technology and the teaching demand of the undergraduate colleges, I constantly study and explore the teaching method of communication principle for the actual situation of our university in the last few years. Now, I preliminary formed the course teaching system which has the characteristics of our university and obtained the good teaching effect.

II. ATTACHES GREAT IMPORTANCE TO THE TEASERS, STIMULATE INTEREST

Communication principle lesson is very boring and hard to understand, students' defensive mechanisms are easy to come up. Therefore, stimulating the students' interest is the key to learning this course. For example: at the beginning of each class, the teacher must pay attention to the problem so as to attract the attention of the students immediately. The methods: the first way is using the natural way at the first sight of this topic. The knowledge the students learned can be reviewed in the class so as to lead to the explanation of the new curriculum and the introduction should be nature and coherent. Experienced teachers tend to be good at exciting the students at the start of class, inspire them into the positive state of mind and stimulating their strong requirements of learning. The second way is presenting the question to attracting the students' attention. For example when lecturing the chapter 7, the teacher can mention that the learned chapter 6 refers to the digital baseband transmission and some signals can be directly transmitted, and then the teacher can ask the question "can all signals directly transfer?" which can lead to digital band-pass transmission[1]. The third way is giving an example before talking about the new lecture. For instance, when teaching the information calculation of many information symbol issued by the many symbols discrete information source, if the teacher

Copyright © 2017, the Authors. Published by Atlantis Press.

This is an open access article under the CC BY-NC license (http://creativecommons.org/licenses/by-nc/4.0/).

do not pay attention to introduce the topic and directly bring up this question, the students may think the problem is abstract and feel not easy to understand so they may not be interested in listening to lectures. However, if taking the telex as an example, it can send different numbers of 0, 1, 2,...9 and 10 in 1 minute of time. At this time, the teacher can ask how to calculate the amount of information. By giving a detailed example, the problem can be presented clearly so the students are more willing to listen the lecture.

III. Using Guide Thinking and Heuristic Teaching

Communication principle is a highly logical, knowledge connected before and after the course, pay attention to inspire guide, give the learning initiative to students, let them have more room for self-study and research, attach importance to teach students are good at learning, make the students' ability of independent access to knowledge[2]. Teacher around "to ask questions, analyze problems, solve the problem" the thinking of coming to class, had to make the students with interest, from which a problem, let students to think for themselves how to analyze and solve the problem. Such as: in PCM coding natural binary code, folding binary encoding, the two coding should choose what kind of, why, when coding which several paragraphs, several section of code, and so on a link closely related to the problem of a link to let the students to think, all the class, students like according to their own way of thinking in learning, understanding, of course, is also very deep.

IV. Update of Teaching Concept

Due to the limited class hour, we have no method to do perfectly when teaching so we should updated the traditional teaching concept and teaching methods. In the teaching plan of undergraduate course, professional curriculum is mostly divided into technology basic course, professional basic course and specialized course. Regarding to the teaching schedule, technology basic course should be firstly learned, then technology basic course is followed by professional basic course and final course is specialized course. Certainly, there are consistency and permeability among different courses in the teaching content. If different comprehensive courses can be integrated studied, continuity can be reached in the teaching process, and the overlap can be minimized to the greatest extent, the teaching content will be arranged by tight and reasonable schedule, the teaching content will tend to be more coherent and systematic, the study hours will be effectively saved, and the teaching efficiency will be improved. Communication principle is as the specialized fundamental course of the information discipline and it has close connection with the signal and system and random signal analysis which are the prerequisite courses. Communication principle course has a lot of knowledge based on the concept of signal or system, Theory knowledge of random signal becomes the important theoretical basis and effective methods of the modern signal processing and it plays the vital role in the knowledge structure of the communication and information system, signal and information processing, electronic information science technology and other profession. The communication principle and the random signal are the important foundation course in the information engineering discipline and they require the students have high foundation of mathematics. Generally, most of the teachers will only focus on the theoretical analysis of the mathematics level and it causes the isolation between theory and practice so that students feel the course content is multifarious, is difficult to be understood and the students do not know how to handle. In other words, students don't know what these technical basic courses can be used for and where they can be used for before they did not touch upon the professional basic course. Therefore, in the beginning of teaching these two courses, the teachers should let the students know the essence of communication is an effective and reliable transmission and exchange of information, and the signal is a means of transmitting information so the students should has a comprehensive analysis and understanding of known signal and random signal before studying the professional basic course. The theoretical foundation of the signal is the mathematical tool of a lot of the follow-up professional courses, such as communication principle. The follow-up communication principle courses discuss how to extract useful signal and intend to introduce the modulation technology from the perspective that signals can be transferred through the practical communication systems. When studying such technical basic course, the professional teacher from the perspective of profession can discuss the functions of the teaching course in the subsequent course of communication principle and its practical application so as to get twice the result with half the effort. Hence, I think the teachers require the students master the basic concept, the theories and methods of signal and random signal analysis and processing. In addition, the teachers should make the students know how to analyze and describe the time domain and frequency domain of the signal, and understand a whole set of theories when analyzing the system (linear and nonlinear) is the basis of analyzing all communication system when teaching signal and random signal analysis. In actual communication system as the main application background, combining frequency spectrum analysis and signal bandwidth, the system analysis and channel transmission characteristics and channel bandwidth, lets the student understand the signal and system analysis in order to better analysis and design is the purpose of the communication system. Such a target, in the subsequent communication principle related content on autopilot, natural transition[3]. In our school chooses fan owing by the communication principle (version 6) as an example, in the practice of teaching, learning chapter 2 known signal and stochastic process, chapter 3, due to the first signal and system of basic courses in professional technology and random signal analysis when studying the two courses "what's the use of, where is the" problem has been solved in advance, students have better, just grasp to review, put forward the key learning points and requirements, can save at least four hours of teaching time.

V. Pay Attention to the Updating of Teaching Method

Communication principle of some theoretical knowledge in the course are abstract, not understanding, but through the proper application of simulation software (MATLAB/Simulink) communication[4]. Using computer

simulation analysis instead of boring tedious theoretical analysis and deduction, including classroom teachers under the simulation teaching and the course of students of simulation practice two aspects. Through simulation teaching classroom, teachers, build communication principle course need all kinds of communication system in the teaching process, and the working process of the analysis system and the effectiveness of the system, reliability, and through this process, many abstract abstruse theory into image, vivid and concrete, the students can better understand the formula to express meaning, from graphics to further deepen the understanding of knowledge and master. From rote remember formulas into give priority to in order to understand the formula and graphics, reduce the students' difficulties in the learning process, so as to effectively improve students' learning enthusiasm and interest, train the ability of independent innovation, improve the ability of problem solving and comprehensive design ability. In teaching of 2PSK modulation demodulation principle, for example, in the coherent demodulation get and receive 2PSK signal of the same frequency and phase coherent carrier is crucial, but exists in the demodulation local carrier recovery 180° phase ambiguity, which would lead to "the phenomenon of the PI" [5]. Common to this "the phenomenon of the PI" more confused. For this, I according to the principle of building a simple based on (MATLAB/Simulink) simulation model of 2PSK modulation demodulation system simulation model is the key point of the system Settings window, real-time observation signal waveform and system running situation, so that the system signal process and transformation have an intuitive understanding, dynamic, and convenient observation simulation model of the source code (absolute), coherent, 2 PSK modulated carrier wave signal, demodulation output multiplier, sampling output decision is absolute code (recovery).

VI. Combined with the Theoretical Teaching, Focuses on the Improvement of Practice Teaching

Principles of communication theory is stronger, in order to deepen students' understanding of the course and application, make full use of the auxiliary teaching experiment means. While, in the course of communication principle experiments, the traditional experiment in part through the communication principle experiment box to verify this teaching theory, and the lack of a comprehensive system experiment and design type of experiments. Comprehensive design experiment is to break the existing scheme, under the condition of some specific requirements and their own comprehensive new experiment schemes and steps, to complete the requirements of the experiments. Because of this composite has higher flexibility, requires students to master the basic knowledge and basic methods in strong under the premise of creative, therefore, in order to comprehensive design experiment as the carrier, is to cultivate students' comprehensive and creative thinking ability is one of the important way. Through the comprehensive design experiment can make students better grasp the experiment principle, operation methods, steps, a comprehensive understanding of the performance of the equipment and proper use of equipment, training students thinking and the ability to analyze and solve problems, improve the comprehensive thinking ability of students. By conducting the work, will be good for schools to cultivate the high quality, comprehensive and innovative talents social needed. To this end, we will introduce MATLAB experiment teaching. Requires students themselves using the MATLAB software powerful graphics functions convert theoretical formula to graphic expression, the simulation analysis. Students can use MATLAB software to comprehensive design experiment system and simulation, such as direct sequence spread spectrum technology design, OFDM receiver transmitter system, etc. These comprehensive design experiment system, and only through the use of communication principle experiment box cannot complete without hardware may carry on the simulation by MATLAB software, obtain good effect. Through MATLAB simulation, on the one hand, make originally boring static theory knowledge become "move" rise, greatly stimulated the students' interest in study. For other modem system of textbooks, students learn to use the simulation method to establish model parameters, the simulation analysis of the "mystery", quickly mastered the relevant principle, avoid the repeated before the theoretical interpretation of the students still don't understand the situation, greatly improve the classroom teaching quality and learning efficiency [6]. With class, on the other hand, guide the use of simulation teaching, students were drawn into the design of the communication system research environment, greatly enhanced the enthusiasm of autonomous learning. Students after class of build communication system, simulation are clarified and discussed more conducive to the classroom to absorb knowledge, at the same time easy is closely linked with engineering practice, conducive to the cultivation of innovation ability. Using MATLAB continuous updates to launch all kinds of library resources, and the library resources is closely related to the latest research and application, can easily complete many comprehensive system of new type communication system design and simulation, for does not meet the given teaching materials and teaching contents of students, especially at the present stage of our school recruit students of an excellent student, you can keep up with the development of professional disciplines, introduction of MATLAB simulation experiments for their reserve enough learning and development space.

VII. Conclusion

In this paper, through the research of communication principle course teaching methods including experimental teaching, and in the practical teaching of the students, the problem of large teaching content and less credit hours. Meanwhile, many students generally reflect the communication principle course is not difficult to learn. Thus, the original boring tasteless theoretical knowledge can be changed to be easy-to-understand through the above reform of the teaching methods so as to stimulate the enthusiasm of students learning and gain good teaching effect.

Acknowledgment

The authors wish to thank my classmates and friends in our laboratory in X'idan University such as Dr. Zhongxian PAN, Xinyin XIANG, Ganchao LIU, Dr. Jie Zheng et al. This work was supported in part by a grant from my work

affiliation: school of electronic information engineering, Foshan University. In this paper, the research was sponsored by the professional comprehensive reform project of electronic information engineering of Foshan University.

REFERENCES

[1] C. Zhigang, "Principle of Communication(the sixth edition)", National defence industry press, Beijing,2010, pp.139–215.

[2] Z. Rongfen, "The exploration of innovative teaching and research of Modern communication principle", J. Course Education Research. vol.7, No. 7, 2013, pp.254-255.

[3] Y. Faquan, L. Zan et al, "A New Specific Combination Method of Wireless Communication Modulation Recognition Based on Clustering and Neural Network," Acta Scientiarum Naturalium Universitatis Sunyatseni, Vol. 54, No.2, 2015, pp.25-30.

[4] Y. Faquan, "Communication systems modeling and simulation in MATLAB", Tsinghua university press, Beijing, 2015, str. 213–315.

[5] S. Wenli, Y. Yanping, "Class and experiment teaching reform of principles of communication", J. Experiment Science and Technology. vol.12, No.1,2014, pp.55-58.

[6] L. Jean, C. Yiping, "The exploration and practice of inadequate teaching hours about the communication principle course", J. Education technology and equipment in China. vol.14,2014, pp.77-79.