Teaching Reform and Exploration of Information Curriculum Group

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***Abstract*— In allusion to problems in information processing curriculum group practice teaching of information correlation majors, according to supervising thought of 'one idea, two goals, three conformities, four steps and six embodiments', a series of teaching reform and exploration are implemented through optimizing curriculum group system as the all and the one, updating curriculum group teaching contents, constructing solid teaching materials and resource. Teaching practises proved that the implemented teaching reform and exploration improved teaching quality, boosted up students' capabilities and acquired distinct person with ability fostering benefit.**

Keywords- Ability Training; Information Processing; Curriculum Group; Teaching Reform

I. INTRODUCTION

Information processing series curriculum are important foundation platform and connecting curriculum for the majors such as communication engineering, electronic information engineering and other professional information[1]. Their basic theory and analysis methods are widely used in automatic control, communication, signal and information processing, circuit and system, measurement and control instrument and so on.

Teaching effect of these information curriculums is directly related to students' knowledge structure and ability. In order to improve the students' knowledge structure and ability, many universities carry on corresponding reform and exploration[2-5]. Based on electronic information and control experimental teaching demonstration center of Hubei Province, Wuhan Institute of Technology information processing curriculum teaching group explores and reforms these curriculum teaching with the guidance of 'one concept, two goals, three conformities, four measures and six embodiments'. One concept is social demand as the guidance and equal attention of both theoretical teaching and ability training. Two goals are student mastering the basic theory systematically and having good ability and quality. Three conformities are theory teaching system, curriculum experiment teaching, extracurricular practice module. Four measures are teaching content innovation, teaching method reform, assessment methods improvement and combining with inside and outside class training. And six embodiments are student innovation and practice ability, employment and graduate rate, teacher echelon construction, teaching research, high-quality curriculum construction and reform feedback. These processed teaching explorations and reform has achieved good effect.

Outline of Information Processing Curriculum Group

In our university, information processing curriculum group involves 6 curriculums: Circuit, Signal and System, Digital Signal Processing, Information Theory and Coding, DSP Principle and Application and Digital Image Processing. In addition, there also involves experimental curriculum and curriculum class design. Each school year, average 12 classes are set up these curriculum and students studying these curriculums are more than 350. Curriculums are arranged in sequence on the teaching time and linked in the content[6]. Circuit Curriculum is about signal carrier and practice research object. It is the theoretical basis of curriculum group. Signal and System and Digital Signal Processing are the curriculums of signal analysis. Through the analysis of different kinds of signals and application of various methods, they achieve the processing of different signal and extract the required information. Information Analysis and Processing Experiment is the integration experiment curriculum of signal and system, theory of digital signal processing. Information Theory and Coding is a curriculum of analysis of communication system, information transmission and the basic theory of compressed. It lays a solid foundation for the follow-up curriculums. DSP principle and application is the way and method which basic theory and signal processing algorithm are putted into practice. Digital image processing is curriculum of signal from the one-dimensional to two-dimensional analysis and an active branch in the information processing. The curriculums are cross each other, but not the same. They are intrinsic undivided connection and form an organic whole.

II. MAIN PROBLEMS EXISTED IN TEACHING PRACTICE

The following main problems are existed in the information processing teaching practice: (1) curriculum knowledge system is not clear in the aspect of theory teaching contents. The teaching content of each curriculum is relatively independent and does not be found and mined their internal relevancy well. (2) in the aspect of curriculum experimental procedures, experimental curriculum arrangement is not reasonable, the contents and project is relatively single, comprehensive and design experiment is less and too easy. Students' abilities cannot be obtained well and creativity can not be effectively played from these kinds of experiments. No correlation between the experimental

curriculums, arrangement of the content does not take into account the cohesive curriculum, did not use a systematic concept to design the whole curriculum group experiment practice[7]. (3) Since students can not understand relationship between special basis curriculum and specialized curriculum, they dislike study special basis curriculum which is of sound theoretical basis. (4) in teaching mode, theory is more biased and it is not enough to combine thoery with practice. Especially, there is still much improvement in the ability, technical skills, cultivation innovation [8].

III. Main Contents of Teaching Reform and Exploration

In view of above problems, curriculum system is reformed and training goal is consummated. Form point to face, a scientific, practical, systematic curriculum system is presented for students. Exploring theory and practice curriculum integration, innovating teaching method and reforming examination methods are processed. Taking application oriented and innovative talent training as the major clue, students are brought up who have strong engineering practical and comprehensive application ability in field as electronic information specialty such as information acquisition, transmission, processing, application etc [9].

A. Integration curriculum architecture based on ability training and forming systemic curriculums

Through research and analysis of these curriculums' teaching content, relationship between each curriculum is straightened out. Through teaching content and schedule adjustment, it is realized to optimize and integrate curriculum teaching content, moreover, to avoid the curriculum teaching contents disjointed or repeat [6]. The 6 curriculums present a breakthrough single curriculum construction model. Small projects as the main line of the project teaching method and outstanding scientific research superiority, a curriculum system of circuit-signal-system from local to the overall is formed.

B. Integrated application of experimental teaching content conformity

Similarly, according to characteristics of curriculum integration, reasonable arrangement for the unity of content is designed the practice links of curriculum group from point of view of system in experiment teaching. Information platform for basic research practice ability training is established.

C. Conformity of teaching content oriented research design type

Combined with students' interest, classrom teaching content and other projects are introjected. Adopting progressive step manner of 'interest, understanding, practice and application' cultivates students' learning interest and practice ability step by step and promotes the innovation ability training.

D. Innovation curriculum group teaching methods to enable students to achieve unity of emotion and reason

In teaching methods, actively elicitation-discussion teaching methods are putted into practice instead of single cramming classroom teaching method and students' innovation ability cultivation are laid stress on. Teacher prepares for lessons adequately, revises teaching plan continually and improves teaching methods. In addition to original teaching methods such as asking and answering between teacher and student, some new methods are adopted such as small group learning, group discussion, students teaching, free operation and case teaching etc. Farther more, curriculum group teachers make full use of modern information technology and execute teaching content as multimedia curriculum ware. Basic concept and theory are explained and displayed clearly through the video, animation and simulation demo and so on. These vivid teaching methods improve the enthusiasm and initiative of students learning[10].

E. Exploring new examination and evaluation way and realizing curriculum reform goal

In order to implement curriculum group framework concept and promote students comprehensive development, new examination and evaluation ways are explored to boost achieving curriculum reform goal. The examination reform and evaluation methods pay equal attention to both study process and result. The final total mark is consisted of regular grade, practical grade, ability examination grade and final exam grade etc. Where regular grade includes many kinds of usual process assessment such as usual class performance, homework, class test score, classroom discussion and reading report. Regular grade and practice grade are accounted for 50%, but there is no final exam sometime. Although there is final exam, the final examination paper thinks much of ability assessment and subjective item is accounted for over 70%.

IV. Teaching Reform Effect

Curriculum group teachers insist on the long-term teaching reform, explore and attempt actively advanced teaching methods. Therfore, diligent realistic and continuous teaching innovation is formed. Also good teaching effect is obtained.

A. Student knowledge level, innovation and practice ability significantly improving

Through information processing curriculum group reform, students' basic theory, experimental operation skills and comprehensive abilities are improved obviously. Quality of students' graduation design, various design contest winning and employment adaptability are also significantly improved. In the past 3 years, a total of 28 students' graduation design was named Hubei province outstanding undergraduate thesis. Over 15 students won national, provincial and ministerial level awards in many contests. In additional 9 students were obtained national invention patents and over 15 students have published papers, of which there are 6 students' papers cited by EI.

B. *Employment and postgraduate rate rising steadily*

In line with the social demand as the direction, improving student practice and innovation ability are focused on. Engineering consciousness and innovation spirit cultivating is paid attention to, at the same time, major core curriculums are strengthened. In the past 3 years, graduates' employment rate has remained at about 95% and students are praised by employers. There are a lot of students employed by well-known enterprises. Through teaching reform, postgraduate rate is rising from 15.3% in 2010 to 22.1% in 2013.

C. *Fruitful teaching research achievements*

Since information processing series curriculum reform, teacher team has made great progress and development in teaching research. In the past 3 years 5 teaching research projects has been obtained, 9 papers about these curriculum teaching research have been published in open publication journals and 6 books have been published by important press such as publishing House of electronics industry.

D. *Cultivating excellent teacher team*

In recent years, the teaching team has been greatly optimized in age, degree, professional ranks and titles structure. At present, there are 5 professors, 5 associate professors, and 6 lecturers. All teachers have master's degree, 7 of them receive doctor's degree. A teacher team full of vitality with reasonable degree, title and age, innovation, enthusiasm for the work is formed. Their teaching effect is good. And they are often praised by school supervisors and students. Some teachers won teaching prize in teaching contest such as young teachers' basic teaching skills competition, young teacher speech contest and so on.

E. *Strengthen construction of excellent curriculum*

Information curriculums are the basic and key curriculum of electronic information majors. Thereinto, circuit, signal and system, digital signal processing curriculum is not only the required mastering employment theory curriculum for students but also the compulsory examination subjects in the postgraduate exam. Through years of efforts, the curriculum ‘circuit’ has approved as Hubei Provincial excellent curriculum and has a demonstration effect in the province. ‘Signal and systems’ and ‘digital signal processing’ were rated as excellent curriculum in our university.

F. *Good reform effect feedback*

Reform effect has a high appraisal and recognition by students, teachers, university teaching steering group and other peer supervision groups. It has been widely accepted that teacher team has clear flexible advanced teaching methods and achieves good teaching effect. Curriculum instructor has been rated as outstanding in the teaching evaluation. It can be focused to mobilize the enthusiasm of students and improve their ability of practical operation. Also it is welcomed by the students and can improve students’ practical ability, innovation awareness. A large number of qualified information application talents are trained for Hubei province and even the whole country.

V. CONCLUSION

Through overall optimization of curriculum system, renewing teaching contents, constructing stereoscopic teaching materials and teaching resources, a series of teaching reform and exploration were implemented. Teaching reforms highlights one concept, two goals, three conformities, four measures and six embodiments. And it has obtained good teaching effect. The application of the obtained research results benefits remarkable talent cultivation in student training.

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