Exploration and Thinking on the Course Construction of Robotics in Provincial Colleges *

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Abstract. Aiming at the cultivation of students majoring in intelligent science and technology in Wuhan Institute of Technology, this paper expounds the present situation of the construction of the course of robotics by means of orientation, investigation and analysis. Secondly, this paper analyzes the problems existing in the current robot teaching, and gives the ideas and approaches of the construction of the robotics curriculum.

1. Analysis of the Current Situation of Robotics Course

In 2004, the intelligent science and technology professionals are approved to establish, and there are dozens of colleges and universities to set up or cultivate intelligence science and technology professionals. The intelligent science and technology professionals of Wuhan Institute of Technology are set up in 2005. Robot competition is the advantage of intelligent science and technology professionals of Wuhan Institute of Technology, which gets a total of twelve world champions during ten years. Therefore, the robotics course is the core course of intelligent science and technology professionals.

Many universities in the country offer robotics courses. Central South University professor Cai Zixing as the founder of intelligent science build the robotics courses in School of information science and technology of Central South University. Tsinghua University, Peking University, Xiamen University, Beijing Institute of Technology, Zhongshan University, Guilin University of Electronic Technology, Capital Normal University, Beijing University of Science and Technology and other colleges and universities are in the undergraduate or graduate level to set up robotics course. Some colleges and universities relying on strong scientific research strength, sets up corresponding robot research institute, which establishes Robotics Institute of Shanghai Jiao Tong University, Institute of intelligent control of Huazhong University of Science and Technology, training a group of young teachers. In the selection of teaching book, most Universities use the "robot" from Professor Cai Zixing of Central South University or Huazhong University of Science and Technology academician Xiong Youlun. Besides, in the teaching arrangements, they set generally for 24 study time, which teach the kinematics and dynamics modeling about industrial robot; Secondly, the experimental class is set for 8 study time, and some universities do not set up the experimental class.

The intelligence science and technology of Wuhan Institute of Technology is set and the robotics curriculum is established at the same time. For the no strong scientific research strength as the basis, the robot course teaching and research is the basic from scratch. We have always taken a groping way in the process of teaching, which lead to the teaching effect and students' learning interest low. The student of the intelligence science and technology is very low degree of recognition for specialty and course. It can be seen from recently the network questionnaire survey of Wuhan Institute of Technology graduation 06, 07, 08, 09 students that the intelligent professional recognition is ranked.

Aiming at the above problems, the university has taken some measures, such as modifying the teaching content, increasing the study time, strengthening students' exercise. Wuhan Institute of 

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Technology encourages students to enter the “robot soccer team” of Hubei Province Key Laboratory of intelligent robot, which trains students' practical ability, cultivates students' interest and other means.

All of these measures are beneficial exploration, and achieve some success. But there are still the following problems:

One problem is out of time from the contents of the old textbooks, which most colleges are still used "robotics" textbook by Professor Cai Zixing of Central South University or Huazhong University of Science and Technology academician Xiong Youlun, only talking about the kinematics and dynamics of industrial robots. The second problem we faced is that the intelligent robot path plans such as machine vision applications, mobile robot planning, and multi-agent multi sensor fusion control does not involve. Finally, Teaching methods and teaching methods are single, and practical teaching is weak.

2. The Problems of the Current Robot Teaching

On the practice of teaching practice: How to scientifically and rationally set up through the four years of practical teaching in universities, and each link to complete the content, target and implementation plan of how to solve the problem; to reform the traditional teaching content, teaching methods, to improve the quality of teaching and the cultivation of students' ability. Besides, we must explore the reasonable and feasible teaching methods and teaching methods. At present, For the current teaching means of the MOOCs class and micro class, how in the limited funds under the condition of making efficient teaching documents, and how to encourage and guide the teachers to participate in the work, and be efficient, orderly and standardized organization and complete the task.

On the teaching team building: The construction of teaching team is one of the most easily ignored in the course construction. We need to grasp the construction of teaching contents, research and implementation of teaching methods, to achieve the construction of teaching contents and teaching methods. In the construction of teachers, we must enhance especially professional knowledge for young teachers, and enhance the teaching level of teachers, strengthening the management of teaching process.

On the problem of textbook compiling: In order to carry out the excellent course education, we must compile the teaching materials and experimental materials and so on. We must organize the teaching materials under the heavy pressure of teaching and scientific research.

Guide students to actively participate in the practice of teaching seriously: How to motivate and inspire students' enthusiasm, to enable students to fully understand the importance of practice teaching for the cultivation of scientific research ability of its own development, rather than simply understood as complete academic tasks. How to organize and manage students effectively. How to stimulate students' interest in robotics. We must improve the new organization mode and operation mechanism, which solve the existing problems in the traditional management mode; and solve the students how to set up a research team, changing from "individual combat" to "team" problem.

How to prevent the curriculum construction form a mere formality, one-sided pursuit of technology and other issues: In the absence of teaching content according to the characteristics of the organization of teaching, whether or not to meet the teaching conditions, if only concerned about the form, there will be a lack of reform and innovation, resulting in one-sided pursuit of teaching technology and form.

3. The Ideas of Robotics Curriculum Construction

In the course of teaching methods, we mainly use the following: group discussion method; task-based teaching; case teaching method; role play; multimedia teaching; the establishment of MOOCs class mechanism, the use of modern network education, to improve teaching efficiency. Secondly, we will reduce the number of classroom teaching time, and increase the number of experimental teaching time (which will greatly increase the proportion of comprehensive and
designed experiments), and increase the total number of weeks of practice teaching. Which encourage teachers to research results into the teaching materials or into the teaching plan or into the experiment. Thirdly, in the teaching content, in addition to the basic content of kinematics and dynamics, we will add visual servo control applications, mobile robot (multi-agent) path planning, multi-sensor fusion control etc., which combines with the principle of automatic control course, dynamic modeling of intelligent robot vision about the position of complete operation (which is the main content of existing robotics of course), calibration, image processing, visual servo controller (after the three robotics course not involved, but the application needs) design a set of content, so that students on the robot application is the whole understanding.

For the poor practical ability of robotics course teachers, we reform and practice as following: one is a system of regular that professional teachers enter to the enterprise practice, which participate in product development and production process of the enterprise; two is that hire technical personnel of enterprises (Shenzhen Eagle Eye Online Technology Co., Ltd.) as part-time teachers and establish engineering practice education center in the enterprise, which make enterprise technical personnel involved in the training process; three is that we cooperate with the British Cilisi Mao University, which exchange teaching and scientific research methods, improving the international level.

In the preparation of teaching materials, first of all, we solve the problem of division of the teacher team. According to the direction of each teacher's research priorities, the allocation of the corresponding chapters is prepared. Secondly, the principles of teaching materials is that have practical and interesting materials; which provide students with the space of thinking and imagination. Enhance students' interest in learning: We will set up a number of robotics research team (each team 4~5 people in the second year of the University, which all students is participated in this year and is, implemented dynamic management. Secondly, we will set up regular lectures, seminars, lectures and other forms, which require experts and students to exchange, to broaden their horizons, strengthen the team and academic exchanges within the team, and create a strong academic atmosphere. Thirdly, we will set up innovative credit for college students, which mean in various types of scientific and technological activities and various provinces and cities in the country and the results of the students to give innovative credits. Students must obtain a certain degree of innovation credits, more than the innovative credits can also offset some elective course credits. Besides, we will strengthen the communication and feedback between teachers and students, which open the communication meeting of the teacher team once a week, and find out the problems in time and adjust the measures to ensure the smooth development of the work.

4. The goal of Curriculum Construction

Through the course of the construction, we hope to cultivate a group of outstanding young teachers, which provide a better development space and growth environment for them. And we aim to create several teachers that have the wide influence and high academic attainments of teaching in the curriculum areas. In addition, through the leadership and guidance of teachers, students have a more clear learning objectives, training students' learning ability and innovation ability.

We aim that establish the provincial excellent curriculum—"robotics". Therefore, we must do the following work in the teaching organization: one is the reasonable teaching organization, teaching system, teaching and arrangements. Two is that organize teaching content for the cultivation of innovative talents, and adopt advanced teaching methods and means. Last is that establish a high level teachers and talents, and cultivate a large number of excellent young teachers. For the reform of personnel training mode, students' comprehensive ability and comprehensive quality has been greatly improved. We have researched all students of the intelligent science and technology major of Wuhan Institute of Technology. We have employed project teaching process to improve students of the ability to analyze and solve problems, and students’ innovative ability, which students can learn more about the needs of the community, to enhance students' practical ability and improve the students' employment competitiveness and entrepreneurship.
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