# The innovation and practice of the teaching mode of programming course group based on collaborative breakthrough

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## Abstract

The difficulty of the program design course group based on collaborative problem-solving is that the concept of "professional talent" cultivation is deeply rooted. The mainstream goal is still professional talents, and the knowledge division between disciplines is clear. In order to cultivate professional talents, the curriculum design emphasizes the systematicness and integrity of each course, and lacks the courses to cultivate comprehensive ability and interdisciplinary research ability. Interdisciplinary teaching involves the collaboration of teachers and teaching platforms of multiple disciplines and departments with a single discipline are often difficult to carry out independently. As a result, there is a serious shortage of interdisciplinary professional courses in Chinese universities, which cannot help students to build up the ability to solve practical problems by comprehensively applying multidisciplinary knowledge. Although collaborative teaching mode has been attached great importance by more and more Chinese colleges and universities, and some colleges and universities have also applied it in the process of talent training teaching practice, the application of collaborative teaching mode in the teaching process is insufficient due to the lack of theoretical guidance, system guarantee, effective team building and other factors.

## Keywords

Collaboration; Programming; Curriculum group; Innovation and practice.

## 1. Cloud technology collaboration

In a cloud environment, program design course with cloud application as a basis for teaching reform of classroom teaching, change the traditional teacher-centered and cramming education teaching mode, establish a program design classroom teaching mode, supported by cloud problem guide for students and to cultivate ability as the center, to implement the teaching pattern of Chinese education informatization, in programming teaching, combined with short animation, video, video technology, enhance the vitality of the teaching, relaxed, lively classroom teaching, change students playing mobile phone, such as reading a novel the phenomenon of distraction, increase students' interest in programming knowledge, Improve the quality of programming classroom teaching. To change the traditional group cooperative learning to cover the pre-class, and constantly expand their knowledge system and teaching skills, teachers, curriculum experts, students need to work together, combined with school-enterprise cooperation, enterprise mentors, enterprise practice, school research and development base, workshop and other links, the use of network information technology and online learning channels.

Interactive communication; Interactive communication is conducted by teachers who formulate interactive problems, the purpose and process of the problems, and students submit interactive results. Teachers assess the structure. In the cooperative learning environment of cloud classroom online learning platform of programming design, teachers play the role of guiding, discussing and participating in learning through online platform and form cooperative learning mode.

Mutual learning: mutual learning, by the teacher design learning resources and learning tasks, to the group as a unit to assign tasks, mutual learning, each group to share learning resources, can be discussed within the group or between groups, through mutual cooperation to jointly complete the assigned tasks. Through the use of cloud classroom resources, online communication tools for online collaborative learning.

Complete tasks: tasks are the most important part of the interactive learning model. Under the guidance of teachers, each group shall collect, analyze and investigate data according to the assigned tasks, and carry out practical operation of program design. The groups acquire theoretical knowledge and operational skills in the process of completing assigned tasks, and acquire abilities in cooperative learning.

## 2. Studio collaboration

The studio teaching mode takes the studio as the teaching unit, and integrates scientific research projects, school-enterprise and school-local cooperation projects into the studio courses. What studio teaching implements is teacher responsibility system. In each semester, the teacher who is responsible for the project shall make a unified planning of the project, divide the tasks to be completed each week according to the number of weeks of the project, explain and guide the key points of the project, and complete the corresponding teaching and design tasks according to the requirements of the course nodes. Studio has some basic characteristic of the design company, but also different from general corporations practice teaching, it is a studio as the carrier, the curriculum and the practice together, based on a reasonable and curriculum group, subject as the core, with professional teachers as a guide, introduce the actual project and project teaching, so that the students can receive better practicality education. Vertically, students have more autonomy and can freely spend their study time. When receiving the task assigned by the tutor, I can actively learn according to the direction I am good at, and no longer passively accept the theories and results that have been achieved. Through investigation, analysis, induction and summary, improve the whole process of understanding the actual project topic. From a horizontal perspective, under the studio teaching mode, students can continuously improve their ability to summarize and express themselves by participating in the complete process of practical projects. Students' active thinking about the research direction of the subject can better cultivate their active learning and research ability. Students constantly look for the best research methods to achieve the best research results, can better cultivate the ability to explore knowledge, and effectively tap the characteristics and potential of students. 2. Optimize the curriculum system. The construction of reasonable curriculum system is the foundation of industrial design professional development. In the first and second years, basic courses are the main courses to gradually enhance students' grasp of professional knowledge. In the third year, students choose to enter the corresponding studios according to their personal strengths and future development direction. According to the studio course arrangement, year completed five ¯ six practical subject, project. At each stage of the course, nine steps are required, including research, disassembly, drawing and platemaking, modeling, rendering, animation, model making, typesetting and exhibition. Meanwhile, various design competitions and exhibitions are interspersed in the course to accumulate practical experience and design results.

## 3. Collaborative innovation

Collaborative innovation has become a new organizational model for innovation-oriented countries and regions to improve their capability of independent innovation. As the complexity of technology innovation, speed up and the development of globalization, the contemporary innovation mode has break through the traditional linear and chain model, presents the characteristics of nonlinear, multiple roles, networking, open, and gradually evolved into on the basis of the multiple main body coordination interaction mode of collaborative innovation, innovation theorists and policy makers by the governments attach great importance to. Throughout the practice of innovation and development in developed countries, one of the most important successful experiences is to break the boundaries of fields, regions and countries, achieve regional and global collaborative innovation, build a huge

innovation network, and achieve the maximum integration of innovation elements. The key to the success of silicon valley lies in the flat and autonomous "joint innovation network" formed by enterprises, universities, research institutions and industry associations in the region, which enables innovation entrepreneurs from all over the world to obtain higher innovation value at lower innovation cost. South Korea in the late 1980 s to imitate Japanese "technology research combination" mode, set up by the national institute of electronic communications for the lead unit, by samsung electronics, LG semiconductor and joint research and development of university, government agencies and other organizations, mainly engaged in the memory of memory chips and its manufacturing equipment and production materials research and development. After 10 years of concerted efforts, samsung, LG and other global semiconductor giants have emerged. They have world-leading core technologies in communication, memory chip, flat panel display and other technical fields. In Europe, with the acceleration of the European integration process, collaborative innovation networks are flourishing. In particular, Finland, Ireland, Sweden, Switzerland and other small Nordic countries are not as strong in technological innovation as Germany, the United Kingdom, France and other old powers. However, by actively promoting collaborative innovation and establishing a global innovation network, their innovation capacity has also made leapfrog development. Finland's "information and communication technology alliance" is composed of more than 200 information and communication enterprises, including nokia, 29 universities and financial service institutions, as well as a number of science and technology intermediary institutions. It has greatly promoted the development of Finland's communication industry and turned Finland from a forestry country into a telecommunications power in the world.

Looking around the country, collaborative innovation has become a new mode of innovation that various provinces and cities are competing to explore. The two bombs and one star project, the manned space program, the chang 'e program and other major technological breakthroughs that have gone down in history are undoubtedly the result of collaborative innovation with Chinese characteristics. The basic economic system in our country has shifted from the planned economy to socialist market economy conditions, the collaborative innovation model of the current our country obviously can't completely follow the practice of the planned economy period, the need to learn from the experience of collaborative innovation in developed countries, in China will have "concentrate resources to accomplish large undertakings", strong social mobilization capacity of socialist system superiority into institutional advantages of collaborative innovation in the whole society. Compared with developed countries, the overall level of science and technology in China still lags far behind. There are many drawbacks in the system and mechanism. Macro-management of science and technology is governed separately. The allocation of science and technology resources and the evaluation system cannot adapt to the new situation of science and technology development and the new requirements of the transformation of government functions, thus hindering the overall improvement of innovation level.

## 4. Reform of teaching links

After a semester of teaching practice, the problems existing in the teaching link have been grasped, and on the basis of practice, put forward the following measures and plans.

### 4.1 Coordinate theoretical teaching, physical intuitive teaching and multimedia teaching

Make full use of multimedia classroom, make multimedia courseware of the whole course. A large number of real objects are cited in the courseware, so that students have an intuitive understanding of program design; In the teaching of the program design to join the field simulation debugging, not only unknowingly introduced the software and enhanced the interest of students, so that the students see is no longer a simple theoretical analysis, but also the intuitive running state and results.

Combining theoretical teaching with physical object visit, for example, students can be taken to the laboratory when talking about program design hardware. Students are required to analyze the model

of program design, interface characteristics and I/O address allocation based on the devices they see before, so as to get twice the result with half the effort.

### 4.2 In the teaching of software programming, case coordination is the main teaching line

According to the teaching objective and teaching content, through typical and practical cases, students are guided to analyze, discuss and design programs to arouse their interest in learning. In case selection, we should grasp the key points and difficulties of current teaching content, pay attention to the knowledge covered by cases, and look for representative cases. Through case analysis, students can easily understand the characteristics of the instruction and master the teaching content in depth.

## 5. Cooperation in experimental design

The general idea of experimental design is to take students as the main body, teachers as the guidance, and change the verification test into a variety of forms of design test. The test is divided into three categories: verification test, reading program and modification program, and design test. Verification test is the basic test, mainly aimed at the basic programming instruction design, the purpose is to make the students who just come into contact with the program design can very well understand the working mode of the program design and its basic instruction usage; As a transition between verification test and design test, the program and program modification test are given according to the control requirements of certain practical cases. The control program can realize certain functions but there are still problems. Students are trained to read and debug the program. The design experiment is a comprehensive application of the learned knowledge, and different instruction programming methods should be emphasized in the topic selection, so as to avoid repeated exercises of this kind of experimental programming on a kind of instruction.

### 5.1 Verification of collaborative experiments

Because the ladder diagram compilation and the understanding are quite simple, the student only needs to choose to do three switch quantity control experiments, including: the basic bit logic instruction exercise, the timer and the counter instruction use, the sequence control experiment three.

### 5.2 Read program and modify program

This kind of experiment is mainly aimed at the system with relatively complex control requirements. After students download the program to the program design, they can see the intuitive operation effect, and it is easy to find the crux of the program. Naturally, they are interested in modifying it, so as to achieve better experimental results. On the other hand, students can learn from others' programming ideas through such programs and lay a solid foundation for independent program design.

### 5.3 Design test

Design experiments account for a large proportion, in the selection of experiments, we should pay attention to practicality, typicality, at the same time, each test for different instructions or different programming methods need to have their own focus. Before the experiment, teachers can give students appropriate hints or give basic design ideas or put forward problems needing attention in the program design, and the theme of the program is completed by students independently.

### 5.4 Simulation test

Limited by the laboratory hardware equipment and conditions, in order to provide students with more practical opportunities, students can be guided to use the simulation software machine design and debugging procedures. At present, most of the company's products provide simulation software, which can expand the scope of teaching experiments without actual hardware equipment. Students can also do programming exercises and complete exercises on their computers after learning, so as to improve their research and development ability. [4]

Practice has proved that the above experimental methods can significantly improve the experimental classroom effect, students' learning enthusiasm and initiative. For example, in the process of

"assembly line simulation" experiment, the experimental program is given and students are expected to read it. The result becomes the mechanical movement of program copying. In the experiment of "simulation of five-phase stepping motor control", 95 students did the experiment after modifying the control requirements in the test guide book and giving the design idea. 3 students completed the experiment earlier but did not leave the laboratory, but helped other students analyze and debug the system. Most students have realized the control requirements after class, and from the point of view of the program, each has its own advantages and disadvantages, in general, there are three completely different design ideas.

## 6. Comprehensive practical training collaborative design

Through the experiment of program design, students can master the basic programming method of program design and the wiring method of I/O interface, but it has little effect on improving students' overall understanding of actual projects and deeply understanding the role and usage of program design in the control system. The comprehensive practical training design has a good effect in this respect.

## Acknowledgments

zhejiang higher education teaching reform research project (project number: jg2015285), zhejiang education and science planning 2017 (university) research project (project number: 2017SCG194)

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