

# Construction and Teaching Research of Programming Courses

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**Abstract**—Through the course objectives and teaching conditions of the software engineering and computer science and technology professional programming courses, the teaching methods and means of such courses are studied, and the implementation effects in the course teaching are discussed, so as to further improve the teaching level.

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| <b>Keywords</b> —course objectives; teaching conditions; software engineering; computer science |
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## I. INTRODUCTION

The programming course is a compulsory basic course for software engineering students; it is also the language of choice for the course "Advanced Language Programming" for computer science and technology. It mainly describes the basic ideas and methods of programming through a programming language. With the acceleration of informationization and the advancement of computer technology, this course

From the basics of programming to high-level language programming, including the idea of advanced programming, suitable for a certain programming foundation

Students further improve their practical skills.

This course adopts standardized teaching methods; merges structural and object-oriented programming and other two parts to adapt to software engineering.

The new profession is geared to the needs of the new situation.

## II. POSITIONING AND COURSE OBJECTIVES

The programming course is a compulsory basic course for the software engineering profession. It takes the programming method as the main line, combines the characteristics of our school, and teaches the basic concepts and basic skills of structured and object-oriented programming from solving practical problems.

Through the study of this course, students will master the basic theories of structured and object-oriented programming, establish good programming

ideas, learn the basic methods and skills of programming, and have the ability to solve problems related to engineering applications with high-level programming languages. And lay a good foundation for the follow-up course.

## III. TEACHING CONDITIONS

Teaching material use and construction

The textbook used in this course is the "Visual C++ Object-Oriented Programming Tutorial" edited by Tsinghua University Press and edited by Wang Yujian (this is one of the widely used textbooks) and the supporting problem sets. At the same time, we independently prepared the lectures used in the lectures, refined the main content of the textbooks, combined with the content of the courses, and added lectures on actual cases, so as not to follow the instructions, let the students listen in class and read after class. Currently, textbooks prepared by the curriculum building group are being organized in the publishing process.

2. Expanding the use of data for students' self-directed learning

According to the different professions and training requirements, we recommend and designate domestic excellent textbooks, such as the recommended textbooks of the Ministry of Education and the key university computer series textbooks as reference books, and specify effective literature materials for students' self-learning and research study.

3. Teaching effect of supporting experimental textbooks

In order to improve the practical effect, on the basis of the experimental instruction book matched with the original teaching materials, we independently prepared the experimental guidance, basically reached the practical teaching requirements, and the effect on improving the students' practical ability was very obvious.

4. Practical teaching environment

There are 2 laboratories (computer rooms) for students to practice on the computer, which constitutes a fully shared experimental research system. Three operating systems are used in the lab: Windows 10 (primary server), Windows 7 (student workstation), and Red Hat Linux 9. It basically covers the current mainstream systems that students may use in the future, ensuring that students have an understanding of various development environments based on specific operating systems and expand their knowledge. In terms of

development tools, different development tools such as VC++ or KDevelop are allowed for different students.

#### 5, network teaching environment

Network courses at the Zhejiang University of Science and Technology, library electronic resources (Superstar Electronic Library, Scholar's Home, Tsinghua Academic Journal, Founder's Electronic Resources), collection digital resources and other online resources and related websites (see list) for the teaching of this course Provide the necessary network environment and teaching platform.

#### IV. TEACHING METHODS AND MEANS

The purpose of use, implementation process, and implementation effects of various teaching methods:

Improving teaching methods is one of the key tasks in the construction of this course. Continuously improve and exchange teaching experience through group discussions of the course building group and seminars of the college. The current teaching method has been extended from the original infusion-based teaching method to the current combination of heuristic and research-based teaching methods to improve students' interest in learning, give full play to the initiative of learning, and cultivate students' self-directed learning awareness and collaboration. spirit.

##### Classroom face-to-face

In classroom face-to-face teaching, teachers use their own electronic courseware to teach and combine case teaching methods with problem teaching methods. When explaining the examples, make full use of the compilation system, let the program execute directly on the computer, increase the intuitiveness, and facilitate the understanding of the students. Practice has proved that this method can achieve twice the result with half the effort. In order to explain the different solutions and effects of the same problem, we inspire students to modify the program and let it observe, in order to achieve the purpose of broadening the horizon and bypassing the class, and the teaching effect is obvious. After the appropriate chapters, organize the exercises, reproduce the typical problems encountered by students in the classroom learning and practice sessions, and ask students to discover the typical mistakes of design ideas. Practice has proved that students can be active in the exercises. Thinking, developing ideas, and getting full recognition from the majority of students. Specific teaching methods include:

Case teaching method. In the teaching, the grammar cases related to the knowledge points and the comprehensive cases with strong pertinence are carefully designed. The grammar case mainly focuses on grammar points. The lesser and more refined cases cover the main grammar points, and most of the time is used for the analysis and explanation of practical cases, allowing students to participate in the analysis and discussion of cases, in the process of analyzing and solving practical problems. On the one hand, it

strengthens and deepens the mastery of grammar points. On the other hand, it cultivates students' ability to use professional knowledge to discover problems, analyze problems and solve problems. At the same time, it also enhances students' interest in studying this course.

Problem teaching method. Cooperate with the case teaching, arrange the thinking questions for the key and difficult problems of the next course, or put forward the practical problems that need to be solved, and ask the students to preview and find the materials in advance so as to focus on the discussion and analysis in the class.

##### practical teaching

The lecturer is required to visit the practice link to give a comment on the student's achievements. In order to achieve the idea of opening up and promoting each other. Specific teaching methods include:

Innovative thinking teaching method. Through the experimental topics with practical business significance, students' interest in learning is stimulated, students' sense of accomplishment after solving problems is increased, the initiative and creativity of learning are fully mobilized, the teaching effect is improved, and the cultivation of innovative ability is achieved.

Collective collaborative teaching method. Mainly from the aspects of data management, business flow management, graphics processing, game development, etc., organize students to carry out development research, conduct group discussions outside the classroom, stimulate students' interest in learning, and cultivate and improve students' team spirit and development ability. To promote.

##### The use of modern information technology means:

In the teaching of programming courses, make full use of modern educational technology means, as follows:

Unified courseware: The course construction team produced standard electronic courseware, requiring the teaching echelon personnel to use it in the actual teaching.

Make full use of network resources: Teachers provide students with network resource names or search channels, which are searched by students themselves, and then organize group discussions to expand the teaching content, improve students' self-learning ability, and achieve good results.

Make full use of the real environment: When explaining the examples, directly use the compilation system to debug the running program on the computer to increase the intuitiveness and facilitate the understanding and mastery of the students. Email Q&A: Answers, assignments and experiments, feedback of results, etc. through the email system.

Overseas examination experience and future research will be implemented and upgraded through the establishment of six major platforms: high-quality curriculum assessment platform, international teaching assessment platform, personalized teaching assessment platform, cultural quality education assessment platform, and innovative practice assessment platform. Through the guidance of the updated assessment system, we will identify and train young talents with expertise in Zhejiang Province to help them embark on the professional path. At each stage, the instructor gives directions and guidance on the direction through the assessment system, and does not directly tell the students what to do.

The research method combines the traditional Chinese educational thoughts with the modern modern examination system, and closely combines scientific research, engineering practice and talent cultivation, so that the educational concept, content, methods and assessment methods adapt to the progress of the times, technological innovation and the all-round development of human beings. Claim. We will attach great importance to and actively promote the reform and innovation of the application-based undergraduate engineering talent assessment model, and the overall design will be promoted step by step. Study the actual needs of high-quality innovative talents in the society, learn from the successful experience of the German University of Applied Sciences, adjust and improve the evaluation method design and evaluation system for applied undergraduate engineering talent education, and establish a scientific research-led assessment system. Starting from the policy system, we will establish an open, mobile, competitive, and collaborative scientific research mechanism, improve the incentive mechanism, and enable the assessment system to be continuously updated.

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