Investigation and Implementation of Teaching Methods of Java Language

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Abstract—The paper analyzed the characteristics of Java programming course. It analyzed the problems in the practical teaching of Java programming course. This paper presents several Java curriculum reform ideas, tools and methods to stimulate the students’ interest in learning, improve practical skills. The purpose of this paper is to develop rigorous logical thinking ability and creative ability, and to equip students with basic project development capabilities. Our Java curriculum reform is aimed to provide more qualified for the software industry, the Java application-oriented talents.

Keywords- Java; case teaching; multimedia teaching; practical skills

I. INTRODUCTION

In Java programs, teachers to students about Java as a general-purpose programming language features and syntax rules of nature. Teachers need to introduce the students of the programming mainstream way of thinking, and to a large number of examples of object-oriented application programming method, so that students have a certain project development capabilities. Thus, Java is a software level student to improve critical software development courses [1].

But in the actual teaching of the course, the following problems exit: Java is difficult to reflect students' general fear of learning Java. Before opening the Java program in C language, so students learn the Java syntax level is relatively easy, such as basic data types, operators, and expressions. But C is a process-oriented language. Java is object-oriented language, students need to think of object-oriented concepts and design, which for most students is a new experience and challenges [2]. Many students do not know how to understand the reaction of "object oriented", the "object" can do and how to do and confused. And program design not only requires designers to have a strong logical thinking, clear thinking, self-study requires the designer to constantly adapt to changes in modern programming techniques. So this caused some students to learn on the pressure, which led to fear of programming.

Too much emphasis on grammar, practice teaching is not enough, ignoring the whole way of thinking and the overall process of implementation problems. Other teachers in the teaching process of the lack of actual project teaching students practical skills and the ability not training.

II. THE CURRENT TEACHING METHODS OF JAVA

In the Java programming content and teaching methods need to do some reforms to improve student interest in learning, to promote the improvement of students' practical skills [4]. Learn a programming language, first of all to master programming ideas, to find the programming sense, once mastered programming ideas, simply to understand the syntax of the language features can be analogy. Programming idea is repeated teaching, observation, analysis, comparison, summarized in the accumulation. Have good programming ideas, logical thinking is very important. In everyday teaching, with specific examples to explain in detail the concept of object-oriented, in addition to heuristic teaching students logical thinking skills, improve their object-oriented analysis and design capabilities. In teaching, to emphasize the application of the full establishment of the system design, to enable students to proceed from the simple example, to master the program structure and examples of some commonly used algorithms, logic capacity is equivalent to theoretical guidance, example algorithm is equivalent to practical experience, Then gradually increase the difficulty to reduce the student's learning difficulty.

A. Case teaching

Case teaching is a real project on modeling and simulation, is under the guidance of teachers, teaching objectives and content according to the needs of students using the case study organizations, research and training capabilities. For programming courses, if there is no case, then, directly explain some abstract, difficult concepts and syntax, and then the teaching process becomes dull. Therefore, in teaching the course in Java, we must abandon the "concept put forward to explain the concept, for example, that" the traditional teaching methods into the case as an important carrier of the organization of teaching, through the case "questions to introduce the method, summed up the conclusions," allowing students to gain comprehensive knowledge.

Introduction of project-driven case study, project-oriented and module-driven, rules of grammar and around the project to penetrate into the teaching process, can allow students to better
understand object-oriented programming ideas, active classroom atmosphere, enhance teaching effect, to stimulate students’ enthusiasm and initiative to improve the students to analyze and solve practical problems and team spirit, enhance curriculum and professional competency requirements of the relevant positions, so that Java programs to apply their knowledge of teaching a real effect. Case to be easy to understand, practical value, the arrangement note that the case step by step, back to back, in some cases, program design principles, methods, experience and refine the general summary of the law to further develop students’ programming ideas.

According to the Java program characteristics, we develop the actual enterprise project application system in the appropriate changes, making system configuration easier, simple teaching cases, make the students understand and master [5]. Active in the teaching process to create a dynamic, relaxed classroom atmosphere, only to completely change the form of interactive teacher talk, students were pleasant situation. Heuristic teaching instead of the traditional spoon-feeding teaching methodology to enhance the teaching and training students to ask questions, contact problems, access to cutting-edge technology, through the students hands-on, interactive between students and teachers to enable students to experience the feelings of innovative practice [6]. For example, we started thinking, encouraging students to introduce their own methods and ideas, and discussions. The use of multimedia courseware for teaching, the amount of information passed to the students more, showing instances. To the learner to express their views and results of the opportunity to be fully display themselves and enhance their consciousness.

B. Multimedia teaching

Multimedia teaching including the use of multimedia courseware for students, language courses mostly relatively boring, too abstract, if using the traditional teaching methods, poor targeting, student interest is low, learning is poor. This should make use of modern multimedia technology to produce multimedia CAI courseware in teaching, to enhance the teaching process interesting, to stimulate the enthusiasm of students [7]. In the CAI courseware, with associated text, pictures, video and other multimedia technology, combined with specific projects, illustrations to teach students a systematic knowledge. For example, the concept of classes and objects, class inheritance, language is difficult to describe clearly the way through the courseware, graphics, forms, etc., and appealing, to improve student interest in learning the Java language, to improve teaching effectiveness.

In teaching methods should make full use of modern multimedia technology, the use of large-screen projection for visual teaching, the use of demonstration - operation - explain teaching methods professor. Interactive multimedia technology for the teaching of teaching and learning environment, students can follow their own learning based on interest in learning to select learning strategies, learning content and their own level of practice, reflecting the dominant position of students. Students in this interactive learning environment with the active participation may help to stimulate interest in learning the formation of motivation. Commissioning and demonstration program to run the process, truly teach computer with a computer, and make teaching a more intuitive and interactive, while increasing the amount of knowledge to teach.

C. Practice-oriented training

The purpose of teaching programming languages is to train students to analyze and solve problems, to have rigorous logical thinking ability and creative ability, have the basic ability to project development. To achieve this purpose is the most effective way to practice. Practice is the content of the integrated use and consolidating and improving, through practice, on the one hand to consolidate previously learned the basics, on the other hands allows students to complete their relevant module, so that students understand the basic process development projects for future development in the Java space to lay the foundation [8]. After teaching the theory, it followed by practice on the machine, so that students theoretical knowledge and practical skills to improve each other. Teachers should be based on actual, well-arranged some of the students’ ability to improve the innovation capacity of after-school and after-school practice and training issues, making the theory and practice of alternating training to enable students to complete yourself some simple projects, making students in problem-solving process to get a sense of accomplishment and confidence to play to the initiative and creativity to improve students' independent thinking, analyze and solve problems.

D. Establishment of an open classroom

In teaching students to fully mobilize the initiative to the student, teacher-led, fully consider the basis of student learning and learning needs of students full of free space, as much as possible to provide complete software, hardware, equipment and other teaching conditions, including high-quality teaching materials, open labs, counseling to improve the experimental system; use of classroom communication, computer room, instant communication tools, BBS and other platforms, many teachers and students communicate, understand the students' knowledge and teaching needs, strengthen teacher-student interaction; in online public schools teaching the course outline, course outline teaching practice, lesson plans, curriculum guidance experiments, problem sets, courseware and curriculum-related reference materials to facilitate learning for students after school. Specific forms of teaching are group discussions, lectures and other papers report, in order to develop students' communication skills and teamwork ability, and can enhance the students understand and grasp of knowledge, students take the initiative to stimulate desire for knowledge.

E. Practice teaching

This includes the type of experimental teaching demonstration, case-based laboratory teaching, curriculum design based experimental teaching, project-driven laboratory teaching, enable students to more in-depth understanding of system development and management process [9]. In practice, we divided the students into several project teams. Each team is responsible for a project subject to simulate the actual operation of the project. Students to progress to report regularly to the teacher, will open to do stage the results show, the total
final results submitted to the project. In practice, teaching students the practical skills and project management capabilities.

F. Explore learning

We value student-centered, so that students teach the subject as a process of interaction with the objective environment to build their own knowledge structure. In the teaching process, teachers guide students to construct a reasonable knowledge structure, the development of students' creative ability and wisdom [10]. Teachers should guide students to practice programming in solving problems with regularity to explore their understanding, help and motivate students to structure their own high-level computer programming courses of knowledge and technology roadmap, so that students gain in self-exploration in learning ability. Driven by practical problems, the teacher is to explain by example the basic programming concepts, the basic approach, focusing on problem-solving ideas, so that students learn by analogy to other aspects of the programming language.

G. Task-driven teaching

Fundamentally, learning activities are creative labor process. Teaching is to develop students' personality. Task-based approach is built around a major practical problem, to design an environment to enable all students to participate in the discussion requires students to solve the problem, assume different roles [11]. From the collection of information, program design, program implementation, to evaluation of learning outcomes, teachers urge students to each other to maintain good cooperative relations, and then work together on the basis of in their duties, to seek ways to solve problems, and ultimately successful completion of the learning task. As a result, it also enhances students' inner experience, to stimulate students' motivation and aspirations.

III. ENHANCE THE PROFESSIONAL QUALITY OF EDUCATION

It should be emphasized professional quality education, the professional quality education integrated into everyday teaching in order to create a unique application-oriented software technology professional. For Java teaching, professional quality education should first emphasize teamwork and collaboration division. The reality of development tasks usually done by a single individual cannot, need to form a powerful team to create a miracle [12]. Therefore, in teaching, the students can be divided into several groups, as a team complete the project in cooperation, through the division of work students can exercise their communication skills and sense of cooperation, which can help students work more quickly in the future to the corporate financial people culture. Second, should develop standardized, standardized coding habits, so that the code has good readability, not only helps to debug the code and transplantation, but also help collaboration between different technologies, the division of labor for the development, expansion of the project of great help.

We work process-oriented, professional competence based on reconstruction and re-teaching content, student’s vocational skills and professional qualities [13]. In the course of selection, the main line of our professional ability to post demand-based, process-oriented work. We work for the software development process, the corresponding decomposition of professional competence. We carry out reconstruction and reorganization of course content, and in accordance with industry to update the curriculum to ensure that the advanced nature of the teaching content and integrity. Students learn content through relevant teaching, vocational skills training of Java technology and professional quality.

JAVA class teachers to teach the central task is to stimulate student interest in learning JAVA. Therefore, teachers should fully prepare lessons before class, determine the appropriate teaching objectives, and select the appropriate teaching content, design, user-friendly teaching methods [14]. The example is not too complex, and to emphasize the concept of teacher professional alternative for JAVA expression. An introductory course because students have not learned the concept of instances used in JAVA - objects, properties, events, methods, etc., so the teachers from the students easy to understand description of the corresponding point of view, to avoid the esoteric, and dampen the enthusiasm of the students. For example, use the button click event, but need to add the appropriate code, you can first do not use the concept of the event, and direct students by double-clicking the Add button to open the code window, add the code directly, and not too much explain part of the contents of the code.

IV. IMPLEMENTATION

We create scenarios based on curriculum teaching and learning environment. We use in line with the cognitive level of teaching methods to stimulate students' curiosity. We fully adopt the "project-oriented" teaching model, in order to complete the project tasks as the goal. We will focus on the task of teaching the solution started to highlight the application of knowledge, and guide students to independent thinking and innovation. Our aim is to train students in research-based learning, inquiry-based learning. Taking into account the student's cognitive level, we use "task driven" teaching methods to explain the start of each lesson. We first introduce the beginning of each class a typical small case, to stimulate the curiosity of students, by the knowledge of the case leads to the corresponding point, and guide students to further explore solutions to problems, so as to achieve the purpose of acquiring knowledge, students of the theory understanding and application of knowledge and ability.

We use an integrated teaching, the integration of theory and practice, focusing on practical ability. Our IT certification and program design through competition encourage independent learning, to encourage innovation. Based on the teaching in the classroom, we encourage students to participate in the related Java certification [15-17]. Through the preparation of relevant IT certification exam, students can exercise self-learning ability, and to promote the knowledge they have learned to sum up and increase the formation of a more systematic knowledge of the course.

Innovative capacity in students, we learn better students, through the organization of the program design competition for
students to track the Java technology, to develop their independent learning and research ability to learn, training students in creative thinking skills. We have successfully held two programming competitions are a great success, popular with students.

Our competency centers, focusing on the students examine the practical application of knowledge capabilities. Through the process of evaluation of classroom teaching, practical training program evaluation, final evaluation of combining theoretical manner. Among them, the classroom teaching process evaluation stressed the usual attendance, classroom discipline, classroom performance, operations; final assessment on the machine and theoretical points of two parts, the main test student’s ability to apply knowledge of the integrated curriculum. Training program focusing on assessing the student's actual ability to analyze problems and solve problems. Therefore, we mainly develop the student's ability to debug the program, innovation and the actual completion of the project, the completion of such training to inspect the report.

V. CONCLUSIONS

Good teaching methods need to continue to improve teaching practice and innovation in the protection of the enthusiasm of students under the premise of the organization in accordace with the laws of cognitive teaching, innovative, individualized, and gradually increase the abilities of students.

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