Application of Project Teaching Method in Java Programming Course

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Keywords: Vocational School; Project Teaching Method; Programming Course

Abstract: Software development courses have the characteristics of strong theoretical, practical and difficult to teach. There are many problems in the teaching process, such as more content, less class hours and poor ability of students' systematic programming. In view of the actual situation of this kind of curriculum, teaching research and practice are carried out, and the strategy of "avoiding difficulties, introducing easily and paying attention to practice" is put forward. The three-stage project teaching method and apprenticeship practice mechanism are adopted, combined with Java programming teaching, the implementation process and problems of project teaching are introduced, the shortcomings of traditional project teaching method are improved, and the teaching effect is good.

1. Introduction

At present, the overall development of higher vocational education cannot keep up with the development of social needs. Taking software specialty as an example, software technology specialty has been set up in higher vocational colleges at present, but few students have been trained to meet the needs of enterprises. Students are unemployed immediately after graduation or re-employed through training courses. However, the data of professional recruitment websites in China, such as no worries about the future, show that the demand for IT posts is the largest, approaching 30% of the total, which indicates that the demand for IT talents is in short supply. On the one hand, with the rapid development of software outsourcing industry, there is a great demand for software engineers. On the other hand, there is a lack of students' practical ability. Embody the advantages of vocational Education in employment has become an urgent problem to be solved [1-2].

In order to give prominence to the cultivation of ability and quality in teaching, teachers with a sense of responsibility and innovation have been exploring various effective teaching methods, such as case teaching method, task teaching method, project teaching method, etc. However, the author finds that there are more or less shortcomings due to the systematic characteristics of professional teaching not taken into account by the above methods, such as case selection can not be done [3].

Close to the reality of life, unclear tasks, project selection is too small or too large. This paper combines the advantages of the above-mentioned teaching methods, tries to avoid their shortcomings, carefully designs the teaching scheme of project teaching method, adopts three-stage project teaching, apprenticeship practice teaching and other strategies, and chooses the current mainstream programming language Java for teaching practice, and achieves good teaching results [4].

2. Benefits of Project Teaching Method

Project teaching method refers to the teaching activities carried out by teachers and students through the implementation of a relatively complete project work. It adopts the methods of teachers' multimedia teaching demonstration, students' division of labour practice, group discussion and team collaborative learning. The process of students 'learning is an inquiry process, which is especially suitable for the teaching of Java course.

2.1. Project Teaching Method Promotes Teachers' Professional Ability

Project teaching is a comprehensive teaching process, requiring teachers to have a wealth of knowledge reserves, but also the ability to constantly expand their professional knowledge. Teachers who teach with project-based teaching method need to do a lot of work before teaching, find suitable projects that can be used in teaching, master the theoretical knowledge and practical skills applied in the whole project, and divide each component of the project into knowledge points for each class according to the needs of teaching, so as to guide students to complete the corresponding tasks. Therefore, it is very necessary for teachers to participate in training and practical project practice in enterprises after class.

2.2. Project Teaching Method Really Benefits Students

Project teaching method can not only help students to accept knowledge actively, but also cultivate students' ability to integrate knowledge, summarize experience and adapt to the changing environment. In the process of project practice, students grasp and understand the knowledge and skills required by the course, experience the hardship and success of participating in the project, and cultivate the ability to analyse and solve problems [5-6].

3. The Implementation Process of Project Teaching Method

3.1. Three-stage Organizational Teaching

In order to avoid the boredom of students' learning process and the urgency of learning to apply, in the process of Applied Project teaching, we avoid the explanation of the project from the beginning, but divide the whole teaching process into three stages: basic knowledge, applied practice and curriculum design stages. Different teaching methods are chosen in each stage, but the core of teaching methods is project teaching. In order to reduce the theoretical explanation and increase the practice class hours, we organize knowledge points according to the content of the project and follow the teaching idea of "avoiding difficulties, introducing easily and paying attention to practice" based on the principle of sufficient theory. The following is a description of the instructional design mechanism with the Java instructional organization.

3.1.1. The first stage (basic knowledge stage)

At this stage, we take Java basic grammar and Object-Oriented programming as knowledge point. In the process of explanation, case teaching method combined with multimedia demonstration is the main method. The case selection avoids the traditional mathematical calculation problems, but chooses some examples which are close to life, interesting and practical to improve students' interest in learning. For example: lottery program, supermarket sales simulation program, etc. These vivid cases are small projects that can be seen as warm-ups before large or medium-sized projects.

3.1.2. The Second Stage (Application Practice Stage)

At this stage, we take Java GUI form design and database programming as knowledge points. Task-based teaching method is the main method in the process of explanation. The amount of programming code in this stage is roughly 2-3 times that in the basic knowledge stage. According to students' cognitive law, teachers explain it in the order of interface design, event programming and database operation. The task size should be less than one theoretical class hour to ensure the integrity of the explanation. Tasks can be: login window design, system main interface design, database query, insert, delete, update and other knowledge points applied in subsequent projects. Because the selected tasks are similar function modules in the follow-up curriculum design projects, it can better train students' ability to learn from one thing to another.

3.1.3. The Third Stage (The Course Design Stage)

The course design stage is the practical training part of Java course, which is used to test the whole teaching effect and the key stage of training students' practical ability. Project teaching

method is used as teaching method. The curriculum is designed to avoid students' interdependence. During the course of curriculum design, the teacher can explain and summarize the project at any time, and the students can complete the curriculum design by imitating under the guidance of the teacher.

3.2. Apprenticeship Practice Teaching

In the process of implementing project teaching method, both teachers and students will complete the change of their roles. Teachers will become technicians in traditional enterprises, and students will become apprentices in new positions. Teachers help students complete the project. Teachers should change the leading role of theoretical explanation into the role of guidance, but in the process of implementation, different teaching links should be divided according to different stages of project implementation. Figure 1 divides six main teaching links, including project modeling, module explanation, tutoring and answering questions, coding implementation, testing and packaging, project summary and improvement.

Because the modeling part involved in the project is not the core content of the program language course and is difficult for students to master, this part is mainly based on teacher's explanation to help students analyze what functions the project needs to achieve. Then the students arrange the development progress independently, complete the coding, and finally realize all the functions of the software.

Learning is a gradual process. Therefore, before the development of the core module, teachers should actively demonstrate the process of making the main module, teach students the steps of analyzing and solving problems, and focus on the explanation of programming ideas and solving ideas.

After project modeling and technical explanation of core modules, students begin to code independently. This link is mainly completed by the students themselves. When students encounter problems, they can ask questions to teachers explain or help them solve problems. However, they are required to record and summarize every problem they solve, which has reduced the workload of teachers 'counseling and strengthened the cultivation of students' learning methods.

The main part of testing and packaging is to integrate the software works developed by students with commercial software as far as possible. Students are required to master the whole process of software production and distribution. Develop students' awareness of software quality and promote students' professional quality.

After submitting the course design works, teachers should organize corresponding experts to summarize the students' works. Comment on the merits and demerits of the work, and review the problems in practice, so that students can see the difference between mature software developers and junior programmers in solving the same problem. This is conducive to deepening students' understanding and digestion of knowledge again.

Through the project summary, students realize the shortcomings of their works. Teachers encourage students to improve their existing works during the holidays, to further familiarize themselves with knowledge points, and to improve project development experience.

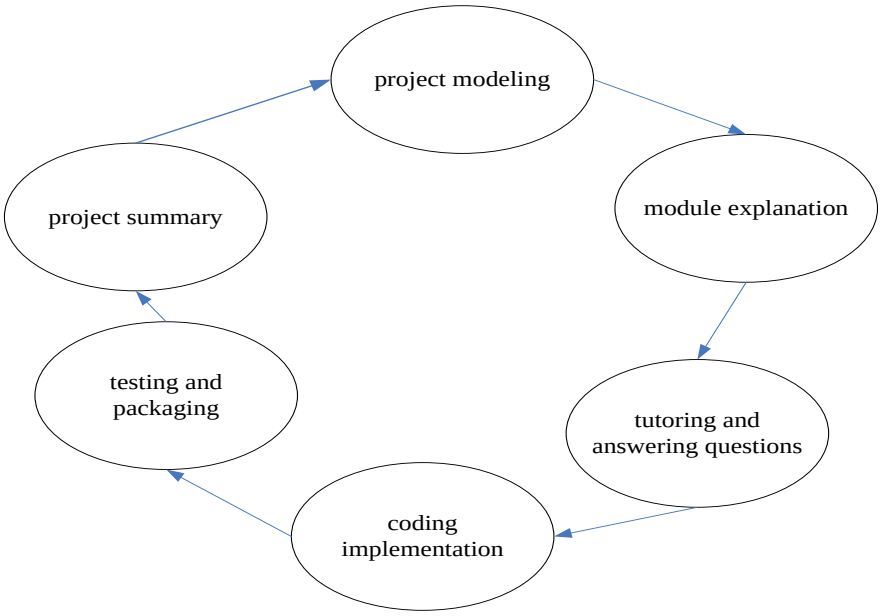

Figure 1 the implementation process chart of apprenticeship project teaching method

4. Problems and Suggestions on Project Teaching Method

4.1. Classroom Management

In the implementation of the project, it is not the class as a unit, but two or three student groups as a unit, so from the surface there will be some "chaos", not as orderly as traditional teaching, so we should strengthen the inspection to prevent some students from doing something unrelated to the project.

4.2. Following the Principle of Gradual Progress

Teachers should follow the law of students ‘cognition in applying project method, simplify first and then multiply. First "case method", then "task method", and finally "project method", combined with the advantages of the three methods, can enable teachers to adapt to the process, students will also subtly accept the teaching process of project teaching method. When choosing subjects for curriculum design, teachers can assign several topics or assign topics by students themselves, as long as they are related to the knowledge points they have learned.

4.3. Organization of Teaching Contents

Project teaching method has no ready-made suitable textbooks. Teachers should redesign the lectures according to the theoretical knowledge of the textbooks and the project examples explained. The workload is relatively heavy at the beginning, but after several lectures, the teaching resources are quite abundant. Teachers can also organize students to participate in the construction of teaching resources, such as the production of teaching websites and examination systems, to further improve students ‘ability to participate in the development of real projects.

4.4. Hours Arrangement and Strategies

In general, the Java course in higher vocational colleges has 72 hours, once a week theory, once on the computer. The class hours are relatively small. It can be increased to 108 hours or the course design can take out one to two weeks of teaching time separately, so as to ensure that students can complete the project simulation practice. In addition, we should consider the differences among students. If the whole class has poor understanding and practical ability, we can "let some students get rich first". We should strengthen the after-class guidance for students with strong programming ability, encourage them to be the second disseminator of knowledge, and use students to guide students, which will reduce the workload of teachers and play a greater role in the exercise of

students themselves.

5. Conclusions

Project teaching method is a practical teaching mode based on project task, focusing on the cultivation of technical application ability and vocational core competence. In the course of software specialty, project teaching method is adopted to improve students ‘interest in programming. Through the project teaching concept of "demonstration, imitation and creation" and apprenticeship practice mechanism, students' interest in programming is gradually cultivated and their programming ability is improved, so that the teaching effect is multiplied with half the effort. Through the practice of Java teaching, it is proved that the project teaching method really realizes the idea of "learning for application" and meets the needs of the development of Vocational Education in China. In the future research, we should also carry out in-depth research on school-enterprise cooperation project teaching, solve the contradiction between school education and enterprise needs as soon as possible, and cultivate talents that enterprises really need.

Acknowledgements

This research has been financed by The Advanced Programming Language Teaching Team Project of Shaanxi Province.

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