Study of Practice Teaching of Software Engineering

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Abstract. There is the homogeneity phenomenon of the project setting of software engineering in the traditional practical teaching, and these setting projects can not completely reflect the requirements of society and enterprises. To these problems we introduce knowledge and skill requirements of the mass data memory, data processing and mobile development into practical teaching, and build development team so as to implement the complex software development. The goal of this approach is to make students grasp the knowledge and experience of the mass data processing, mobile development, and strengthen practical skills of project.

1. Introduction

With the application of all kinds of mobile devices and development of society, the further requirements for talents of the mass data processing and mobile technology have been forward to the present market. Some big software enterprises have an increased need of supporting the mass data processing and mobile products, such as Taobao and Baidu, etc. The software engineering is an important computer curriculum in domestic university, which is also close relationship with software industry. In order to make college students grasp the ability of the mass processing and mobile development, meet the needs of software industries, the teaching reform of software engineering should be implemented in accordance with industry requirement.

At the moment, the practical teaching of software engineering was engineer project-driven. Huang proposed the teaching mode based on project practice, and set up teaching outline, teaching content, and teaching requirement of project practice teaching, so as to improve engineering skills of computer science college students [1]. Wang proposed the case teaching method of combining theory with project practice, which trained the theory and skills of project development by designing the project of ideal for students in project practice [2]. Yang proposed the practical teaching method of carrying out curriculum design of software engineering based on engineering project [3]. Ma proposed construction idea of curriculum group for practical curriculum, which gave implementing scheme of practical curriculum in accordance with the specific case [4].

Though these project implementation methods strengthened the hands-on practice skill of students to a certain extent and acquired some effect of development skill, there was some problem, such as simple project setting, ambiguous requirement and irregular processing management, etc [5, 6]. The existence of these problems, made software engineering students lack of the professional quality, so they can't longer meet the needs of actual requirement of software industry.

2. The Problem of Practice Teaching

2.1 The Simple Project Setting.

The matching project of the different teaching stage should be vaguely similar in project setting, and developed management information system in accordance with seven waterfall model of software engineering. The main function of the system is to insert data into database, simple data processing and data display. All functions are required to strong homogeneity.

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2.2 The Gap between Practice Teaching and Enterprise Requirement.

The former teaching project requires students to develop some simple modules, such as the registration module and login module, etc. These modules only involve small function, which can not embody the feature of software engineering. In addition, these software functions have little mass data storage and processing involved, and are not concerned with practical requirement. With the coming of the mass data, the software system needs to deal with more and more mass data. If the project can't embody the processing of mass data storage and processing, it will not embody the market characteristic. In addition, if the software project can't support the mobile technology, it will not adapt to the requirement of mobile users.

2.3 Lacking of Team Development.

The project development was accomplished by student individual in the former teaching, and was rarely accomplished by student team. However, the present engineering software of large-scale must be accomplished by team. But unlike the personal project, the team development project not only needs more members, but also needs collaboration among team members. The team members need the cooperation, communication with other members in the all cycle of the project. It is required skills and experience of developing the large software project.

3. The Teaching Reforming Method Enterprise Project-driven

The project practice should continue to follow the principles of "step by step", the practice teaching need not only implement teaching of basic knowledge in accordance with teaching outline, but only introduce the enterprise project into the practice teaching, so as to guide students to implement project development in accordance with enterprise requirement, and train the qualified talents of meeting the need of enterprise positions. According to requirement of enterprise project, teacher can take some enterprise project of the mass data storage, data processing and mobile development as practice project. The requirement document of every project need be made after a project is determined, so as to start projects at any time.

3.1 Setting Enterprise project and Avoiding Homogeneity.

The project practice should start out from first and second-year students. During this stage, project practice should focus on performing of programming logics because students only grasp the basic knowledge. In the stage, some projects of high logicality and interest (such as games programming) can be introduced into project sets, so as to inspire students' interest, strengthen learning of basic knowledge of project development.

In middle of second-year or third-year, because students have some ability of software development, can involve in development of database designing and operation, web project. Therefore, some large projects can be introduced into project practice teaching. For example, the development of the network flow analysis system can be used as special project. Students can analyze and monitor network traffic information by the system. In addition, the system needs gather ceaselessly information of equipment and network traffic, store and process the mass data. The project practice produces positive effects on training processing mass data storage and retrieval skills of students.

In this late of third-year, because students have a certain ability of mass data processing, and learn enterprise development technology. Therefore, some mass data and more complex projects can be introduced into the project practice teaching. From these projects, students improve development ability and accumulate project experience, and build a foundation for employment. The online public opinion analysis system can be introduced into project practice teaching in the stage. The online public opinion analysis system acquires the online public opinion by charts, pie-charts and heat map, which is also applied in business domain. For example, the automobile manufactures can get to know of problem of these products, and they can adapt corresponding method to solve these problem.

Above three projects have different aspects of system development. Their difficulties are increasing as the practice teaching. The advantage of this approach is to improve the practical skills of students, narrow the gap between students' abilities and needs of enterprises.

3.2 Implementing the Practice Teaching of Enterprise Project.

(1) The Project of primary stage. In the practical project development, software developers should be of the good ability of object-oriented analysis and programming. And they should grasp use of the set, understand the graphical user interface programming, multithreaded application design, and master mobile development technology. The project of stage is mobile game development based on Android. The project includes some knowledge: object-oriented programming, the set & corresponding algorithms, graphical user interface programming, multithreaded application design, file operation and mobile development technology, etc. The common algorithms include sort algorithms, searching algorithms and traversing algorithms, etc. In addition, because the different games objects have different behaviors, they need deal with these behaviors by multithread programming method. The graphical user interface programming is also very important method in games development, the games objects need to display with the graphical user interface programming. With the quick development of mobile technology, mobile development also became an important development technology, so it is very necessary for games developer to grasp the mobile development technology. Therefore, in practice teaching, we introduce the mobile development technology into project practice, and transplant the game into Android platform, so the games software can meets the needs of the mobile users of games.

The game development can improve the learning interest of software development, and is favor of students' needs that further and systemically grasp the necessary knowledge of software development, so as to lay the foundation for further learning and development. Especially, students can basically grasp the basic knowledge of mobile development by transplanting game Android platform, so as to lay the foundation of the further mobile development.

(2) The project of middle stage. In this stage, students need to have corresponding experience of the web development technology (JSP/Servlet technology), database technology (Oracle, MySQL) and data processing. The network flow analysis system is a software tool of network management. The software developer need to master parsing of Netflow protocol, parallel processing of mass data. Therefore, this project has more difficult. The project includes following knowledge: web development technology, database technology, Netflow protocol, data capture & parsing and mass data processing.

The network flow analysis system covers a wide range of knowledge and it closely related to the real project of enterprise. The difficulty of the project is very close to enterprise project. This will help students improve quickly practical ability.

(3) The project of advanced stage. In this stage, the online public opinion analysis system is also introduced into practice teaching. The system is designed with the mass data and mobile development, which is a real enterprise project. The main technology of the project includes some aspects: requirement analysis of enterprise project, data source, data acquiring technology, data storage, data analysis, authority management and mobile supporting. For online public opinion analysis system, the data source is a very important technology. The system need acquire the corresponding data from network, such as Sina.com, Sohu.com and Phoenix, etc. The system will analyze public opinion by acquired data.

3.3 Implementing Project Development of Team.

Recently, with the increasing for scale of application software, the complexity of software system also increase. The method of software development of engineering software is based on team development. The team development involves functional segmentation, team member collaboration, staff allocation and schedule control, etc. The team development is development method of complex processing and great difficult. The students have implemented successfully the large project only under training. Team development training includes following aspects:

(1) Team building. Only by mutual understanding and trust can the team members together finish the project.

(2) The team collaboration. Many members together finish a software project with suitable source code manager server. They implement software development with sharing the resource of server. Many members modify the source code at the same time, which could lead to clash. Therefore, in order to clash of programming processing, the corresponding rules of team development should be made, such as the operation queue of modification, multi-configuration file, etc.

(3) The task segmentation. With the guidance of project leader, team members implement fully exchanges and communication each other. To begin with, the project needs be divided into many subtasks in order. Next, every member dedicated to one part of the project.

(4) Schedules control and staff allocation. In order to ensure the smooth running of the project, each members of the project team needs submit its report to project leader very day. The project leader needs allocate reasonably and managed scientifically in accordance with project schedules report.

The network flow analysis system and the online public opinion analysis have some characteristics of complex structure and high difficultly. The network flow analysis system is less work than the online public opinion analysis, and the project team of the network flow analysis system needs consist of three to four development members. Because the online public opinion analysis has higher difficulty, it needs consist of at least 5 development members. In addition, it needs implement development of web and Android platform. The team development method can improve project lead ability and project management ability of students; further improve professional quality of students.

4. Summary

In order to ensure the quality of projects, this paper think that the project setting of every stage should has different emphases, and reduce the homogeneity of the project. In practice teaching, introducing lager scale project into project development, which meets the needs of software industry. Especially, the mass data processing and mobile development technology reduce gap between practice teaching and enterprise project. In addition, by training of team development, students have some skills of project leading, project management and team development, master team development of enterprise requiement. These professional quality meets the position requirement of enterprise, which can reinforce students'employing competition.

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