Reasonable Effective Course Assignment Design for "Web Programming"

Yuying Jiang
Dept. Computer Science
Jinan University
Guangzhou, China
313jyy@163.com

Zhan Huang
Dept. Computer Science
Jinan University
Guangzhou, China
huangzhan819@qq.com

***Abstract*—"Web Programming" is a complicated and comprehensive practical course with numerous knowledge points. Characteristics of the course and problems that exist in teaching are analyzed. Significance and peculiarities of the course assignments in teaching are discussed. A practical exploration has been made in optimization of the course assignment design to improve the teaching quality. Practice has proved that well-designed effective and reasonable assignments are very beneficial for improving the teaching quality and compensating for the influence of insufficient class hours on teaching effectiveness, based on the course characteristics, teaching objectives, teaching plans and teaching hours.**

Keywords—Course assignment; Assignment design; Classroom teaching; Teaching quality; Web programming

I. INTRODUCTION

With the development of Internet technology, the application of Web technology is becoming more and more widespread. Therefore, "Web programming" has become a widely offered course for computer-related specialties in colleges and universities. However, because of its numerous knowledge points, complexity, and new technologies emerged, coupled with differences in course schedule for different schools and different majors, the offered "Web programming" course has many differences in teaching content and classroom scheduling (usually 2 or 3 credits)[1]. To some extent, this course is a "hard for teaching, hard for learning" course.

As an elective course for majors in software engineering and computer science and technology, the teaching objective of the course is to enable students to understand and learn the basic knowledge and development technology of Web programming, to understand the basic principles of Web development, to gain capabilities of server-side software development, to lay a solid foundation for developing good working skills. In our undergraduate program, this course has only 45 instruction hours (including 9 lab hours), of which the class hours is relatively less, being a negative factor for teaching objectives and effects. Therefore, besides a reasonable schedule for classroom teaching and labs, especially, well-designed effective and reasonable assignments have become important means to improve the teaching quality.

II. PROBLEMS IN TEACHINHG

A. Teaching Objective, Content and Requirement

The "Web Programming" course are opened mainly for majors in Software Engineering or Computer Science and Technology, while also allowing other computer related majors or non-computer majors to choose. The teaching objective of the course is to enable students to master the basic concepts and knowledge of Web technology, understand the related technology comprehensively, gain capabilities of server-side software development, and have strong comprehensive practice ability and the ability to solve practical problems; At the same time, students are enabled to strengthen their innovation consciousness, self-study ability and the ability of comprehending things by analogy. Upon completion of this course, students can easily learn and apply the extracurricular knowledge of Web technology, laying a good foundation for future development.

According to given teaching hours and the above teaching objectives, the course covers the following teaching topics: 1) Web page design technology, including introduction to Html, CSS and JavaScript. 2) Web server-side technology on ASP. NET, including C#, ASP.NET built-in objects, ASP.NET server controls (basic controls, validation controls, navigation controls, and login controls, and so on), ASP.NET state management technology, and using ADO.NET object and data controls to access the underlying database, with focuses on: Web page design and layout, built-in ASP.NET objects, ASP.NET server controls, ADO.NET objects and database controls, and state management techniques.

B. Impact of Existing Teaching Hours

The total teaching hours of this course is 45 hours, 36 hours for theory and 9 hours for experiment. By removing the amount of time for examination and review, the actual teaching hour for theory is only 32 hours. As a result, the class hours of both theory and experiment are relatively less. The existing schedule, no doubt, is not conducive to the realization of the teaching goals. To cover knowledge points of both basic and extensive client technology, and to focus on one of the platforms of server-side technologies (ASP.NET) with both breadth and depth, emphasizing the integrated application, the limited classroom teaching hours is not sufficient to achieve good teaching effect.

Therefore, the design of reasonable, effective assignments has become an important measure to achieve teaching objectives, and improve the teaching quality [2].

III. Significance and Particularity of Assignments in the Course

For any one course, the arrangement of reasonable and effective assignments is a very important teaching method. For this course, the assignment is particularly critical. Web technology itself is multifarious, and teaching content in each classroom is complex, and all linked with one another. If students are not able to review and consolidate it through assignment timely, especially programming practice, it is difficult to grasp what they have learned in class, and it will affect the learning of next lecture, giving students the feeling of "messy and difficult."

For some professional basic courses, such as "computer organization principle", "operating system", have been plenty of sophisticated exercises. Some mainstream textbooks may contain a large number of comprehensive, focused and various types of exercises. And because there are separate experiment courses, teachers often simply select exercises from the textbooks as assignments. But "Web programming" is different, since the Web technology is extensive, especially on the server side technology, there exist different platforms such as PHP, ASP.NET, JSP, etc.. Even though for the same technology, different teaching materials have many differences in the focus, depth and breadth. Furthermore, exercises provided in a textbook, whether it is knowledge coverage, depth, or comprehensive application training, are not very complete. And so, you cannot simply select questions only from the textbook as assignments to the students at all.

Therefore, teachers must access to a large number of reference materials and literatures, from which to select the appropriate exercises as assignments, rather than choose some of the questions from the textbook for students. At the same time, teachers must design the assignments carefully (including content, form, difficulty, etc.) based on the teaching objectives, curriculum system, teaching requirements, teaching content and teaching hours.

IV. Assignment Design

A. Assignment Types

We design a wealth of assignment types to help meet the requirements of different levels of knowledge: multiple choices, true or false, fill in the blank, essay questions, practical training questions.

Mastering basic concepts and knowledge is the basis of improving students' comprehensive practical ability. Because Web technology contains a large number of complicated knowledge points, it is difficult for students to master merely through classroom teaching and reading materials. In this regard, the multiple choice question provides a good opportunity, since it focuses on the knowledge points and the process is not boring and time-consuming, therefore, it is easier to be accepted by students. So it can be arranged more, to enable students to review and master the knowledge easily. In addition, the multiple choice questions also have multiplier effects.

By doing the fill in the blank and essay questions, students can further consolidate their memory, making the master of knowledge more firmly.

The practical training questions can effectively improve the students' ability to solve practical problems, and stimulate their interests and enthusiasm for learning, and can compensate for the lack of experimental hours. The practical training questions must be programming questions whose topics are flexible, complex or simple. For example, it can be a program written in C#, or a Web page design, or development of a small website. The practical training questions can also contribute to the deeply understanding and mastering of Web programming knowledge such as properties and methods of the ASP.NET Web controls and built-in objects which are described briefly only in textbooks, and limited classroom hours can only introduce some of the highlights. By doing the practical training questions, students are allowed to consult information on their own, and then master the knowledge by programming in a practical trial manner.

B. Assignment Content

After each class, there are a certain amount of extracurricular assignments whose content is finely designed. These assignments include the above five basic types. Some selected from reference materials, while others are designed and developed based on the teachers' own teaching content and requirements, and thus have good relevance and flexibility, and better effects.

The assignments mainly involve the following contents: first, the contents of the current lecture; second, the contents for self-study or preview; third, the contents of several lectures. The assignments of the first and second are assigned in forms of the above five types of questions. Because of the strong practical characteristics of the Web technology, it is not conducive to students' comprehensive programming training if the relevant knowledge and technology are presented in a fragmented form. Therefore, the practical training questions are not only related to the current lecture, but also related to the prior lectures, for example, the current practical training question may be a continuation of the previous questions. Several practical training questions constitute a whole project, so that not only the knowledge points are linked up and put into practice, but students are enabled to be keenly aware of how to apply what they have learned. In addition, it can also be a part of the comprehensive programming experiments, so that in the limited lab hours, students only need to solve the key problems. The final release to the teacher is a content-rich, comprehensive strong experiment, from which students may benefit a lot [3].

In addition, taking into account students from different computer related majors with differences in their abilities, interests, and demands, we assign two types of exercises: required or optional. The required exercises cover the syllabus content, involving five types of questions, especially the fill in

the blank and practical training questions. On this basis, a certain number of questions are assigned as optional, of which some are suited for students who have ample force and hope to expand their knowledge and application ability; others are those with a certain degree of difficulty, involving skills that can stimulate interests and cultivate the spirit of innovation.

V. IMPLEMENTATION, RESULTS AND IMPROVEMENTS

Since 2012, we have started to strengthen our emphasis on the improvement of course assignments in the process of teaching. Based on teaching objectives and teaching plan, we have designed content-rich and diverse types of assignments which are beneficial to improve students' comprehensive practice abilities; at the same time, students are required to complete the assignments on time, so that on one hand, students can grasp and apply knowledge in classroom teaching, on the other hand, teachers can improve teaching methods and assignment design according to the completion state of assignments. Each year, the assignments have been re-designed and optimized on the basis of the previous year for four consecutive years since 2012.

By practice, it is proved that this method is very useful for the realization of teaching objectives and the improvement of teaching quality. Students not only have a strong grasp of the relevant knowledge, but also feel "relaxed, active and interested", and the ability to program and solve problems have been greatly improved. One example is that some of the students who have taken this course choose the development of Web applications as their graduate thesis and design. It is the most direct benefit that a solid foundation for Web programming reduces the burden on graduation design process. In addition, due to the assignments assigned after each lecture, students can timely grasp what they have learned, leaving no "debts". So in the final exam, a little effort on review can make a good result which can be described as "get twice the result with half the effort."

But, a large number of content-rich, diverse forms of assignments are great helps in improving the quality of teaching, at the same time, it also give the teacher a great burden of correcting assignments. Therefore, we consider development of an online platform for automatic correction of certain assignments. For this purpose, we use the "Network Teaching Platform of Jinan University", which is jointly developed by Jinan University and Blackboard Company. This platform is a general network teaching platform, in which the "Test" function allows the students to answer questions online and assess automatically; teachers can check the students' test results and scores. Multiple-choice, True or False, fill in the blank and other objective questions are assigned on this teaching platform, so there is no need to correct these time-consuming and laborious assignments manually; Teachers simply focus on correcting the essay questions and practical training questions. Teachers can recognize the students' learning situation, and solve the problems in time, and improve the efficiency of teaching [4].

VI. CONCLUSIONS

For any one course, the course assignment design is an extremely important link in the process of teaching, especially for "Web Programming." Assignment design should be combined with the characteristics of the course, teaching objectives, lesson plans and teaching hours. The forms and contents should be rich, varied, flexible and targeted. Assignments can also be used to compensate for the lack of experimental class hours.

Practice has proved that, well-designed effective and reasonable assignments not only allow students to master the basic knowledge and development techniques effectively, but also cultivate students' interests in the course, stimulate learning enthusiasm and innovation consciousness, and improve students' comprehensive practical ability to solve practical problems, and strengthen the ability of comprehend by analogy, thus greatly improve the quality of teaching.

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