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The Course Design for Algorithm Analysis and Research on Improving the Students' Comprehensive Ability

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Abstract

The Course design for algorithm analysis is a compulsory course of practical teaching. From the theoretical study, experimental design, standard of evaluation and cultivation of innovation, it summarizes the effect that algorithm analysis has on improving students' Comprehensive ability.

Index Terms: Algorithm analysis; Course design; The teaching quality; Comprehensive ability

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1. Introduction

At the end of spring semester in the third year, students in the information and computation major take the course design for algorithm analysis during 1.5 weeks.

1.1 Purpose for course design

Course design for algorithm analysis is an important practical teaching step of the information and computation major and it is a comprehensive course design when the algorithm analysis course for mathematical sciences is finished.

Through the course design, students will improve the ability to software development by synthetically using what they have learnt. On the other hand, it can help students consolidate and expand professional knowledge, preparing for the graduation design, laying a solid foundation for future study, scientific research and project development.

Through practical step of Course design for algorithm analysis, students can use the basic theory and practical knowledge of computer language, data structure, software engineering and algorithm analysis to correctly solve the efficiency and rationality of the software, and finishing the project reasonably, improving the ability to the software design and learning to use the related references.

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1.2 Features of course design

1) Covering a wide range of knowledge. The design process involving in many courses, including knowledge of computer programming, data structure, software engineering, database management. Course design for algorithm analysis is a training process of reasonable use of comprehensive knowledge, so it is important to master some basic courses well if you want to complete the course design successfully.

2) A good practical course design. The content of Course design includes the project development and complex algorithm analysis. From the cultivation of students' application ability, based on the development of software, the course design focuses on cultivation of students' application ability to algorithm analysis and engineering quality education. It plays an important role in training the students' ability to analyze and solve the question, innovation ability and practice ability [1].

3) Flexibility of knowledge. The application of the algorithm analysis is of great flexibility in different conditions. Even in the same conditions, it may have different methods to deal with. It needs objective analysis according to the specific situation. A design project may have a variety of design schemes, we need to select the best scheme by comparing and analyzing the advantages and disadvantages of each scheme.

4) Close relation with software company. Design is closely related to the practical environment of the development of a software company. Many design subjects are come up with by the software company directly. Learning effects directly affect the course design. Therefore, the course design should be beyond the book knowledge. More important, it should be linked with the actual production.

5) Needing more design information which is difficult to find. When we take the course design, we need to look up the relevant materials, design methods and guide books about the theory of algorithms and data structure. Students know little about it before taking this course design.

2. Problems and defects which the course design for algorithm analysis exist

2.1 Unclear purpose of design and insufficient understanding of the importance to the course design

Most students pay no enough attention to the importance and purpose of the course design. Some students don't realize that it's a good chance to apply the theory to the practice. During the course design, most students cannot combine what they learned with the design contents organically. It is hard for them to actively think about and analyze the problem. Influenced by the traditional teaching ideas, they treat the course design as a usual one and just complete the design according to the designing steps of instruction and related material without autonomy. As a result, the designing effect is not ideal and it is not good for cultivating students' practical abilities.

2.2 Be weak in using theoretical knowledge and information

Students are not good at finding main problems and grasping the principal contradiction in the design topic and tasks. At the beginning of the course design, the students don't know how to start and wait to rely on teachers' guiding. As a result, the goal is not clear. The Students don't know how to look up the reference to find the thought and the method for the design. As a result, they are not clear about the design content and goal, leading to a disorganized design idea and creativity unreflected.

2.3 *Poor ability to express their design intention*

To the majority of students, the design specifications they write are not standard, including unclear statement about design concept, theory, method and no essential statement about conclusions, good result and existing problems. The directory is not matched with the contents. In some designs, there is no reference. Some students can not properly introduce their design in the given time. To the design content, the students make no difference as to which was the main and which was the secondary regardless of the ideas and methods to solve the problem correctly.

2.4 *Lacking of teamwork*

Although the students can think independently to finish the design, they need to brainstorm, absorbing others' correct opinions. In actual design process, there are two kinds of problems. First, part of the students fear of difficulty and lack of confidence in the design. They are reluctant to study assiduously. Even worse, they relinquish attempt, waiting for copying someone else's achievements. Another problem is that the students take the course design without teamwork. Lacking of conformity, they do it with their own plan. As a result, it is a waste of time. Some students' enthusiasm will not be aroused [2].

Problems above reflect the students' poor practical ability. The main reason is "exam-oriented" education to students and the influence of "input the knowledge to students for the purpose". The achievement evaluation is only by paper exam and it blocks the students' creativity. The students can't independently finish the design work.

3. Discuss the reform and development for teaching system of course design

3.1 *make clear of the cultivation objective and change conception for course design*

The course design for algorithm analysis is not only a teaching step for the students to consolidate what they have already learned but also a good training process of combining production practice with theory after completing the production practice. The course design for algorithm analysis can not be simply as a process of teaching. We should change conception for course design, realizing that course design is the most effective way to cultivate students' practice ability, spirit of innovation and comprehensive quality. Through taking the course design, it improves the students' ability to work independently and quality adapting to the professional working environment.

3.2 *Develop the advantage of curriculum designing and improve students' comprehensive quality and ability*

In order to ensure the quality of course design, it is important if teachers can correctly guide students to discover and solve the problem in design, motivating the student to take the course design. It is the key to build a high-quality guide teachers team in improving the quality of the course design. Teachers is a dominant position in the design process. We should pay attention to the training work for the guide teachers, trying to arrange more experienced teachers to guide design. On the other hand, we should accelerate the cultivation of young teachers and stable the current guide teachers.

3.3 Pay attention to the choice of course design subject and rich the content of course design

The choice to the subject of Course design will directly affect the students' design itself. The subject should both meets the teaching requirements and the content must be modern consciousness and advanced. As well, subject should be practical , feasible and diversity. The students independently choose the given design topic by their own ability. For the choice to the subject, the teachers grasp to whole. It is only the diversity of design topic that we can broaden the knowledge. At the same time, we should strengthen the communication, exchanges and cooperation between teachers and students, riching content and the thinking way of course design, and cultivating students' intersectorial and team spirit.

3.4 strengthen management of course design and improve the design quality

Due to the expansion of enrollment and the increase in student numbers, it will bring some difficulties to the organization and the management of the course design. We need to establish and perfect a management system of the curriculum design. Teaching program of the Course design should be properly modified and updated. At the same time, we should make the strict rules of course design and stress its importance of the course, strengthening the management of the course design.

3.5 Stress the students' subject position in the course design

Before course design, we will make students realize that they are the subject of practice activities. From comprehending subject, cousluting, determining the method to design, calculation and design specification completed, we will do all by ourselves so that we will eliminate the students' reliant mind and help them with initiative and creativity, improving their practice ability. In the future, when they have the problem, they will analyze independently, thinking how to solve. In this way, we will reach the objective [3].

At the beginning of the course design, Teachers should guide students to understand the design purpose, background of designing subject, significance of research , application value, the knowledge, skills and methods to solve problems, conduct the student to make the feasible design scheme independently, and finally the students can assess their own design .

3.6 Objective evaluation of course design

Assessment is a comprehensive evaluation for students' performance and working quality in the whole course design and a good way to motivate students. Thus, we need to take strict measures to ensure the quality of practice.

In the past, for some individual evaluation results, more emphasis are on process of evaluation and brownie points, unable to evaluate the individual participate in the course design and the basic ability to solve problems. We don't pay much attenion the ability to the students' practical ability . It is required to concern both the process and result, stressing the deversity of evaluation in the course design. In practice, if the evaluation index system ,evaluating points , system and the method in the course design are not easy to implement or too complex, it will not reach the evaluation purpose for the course design. Practice proves that the technical problems for evaluation in the course design can be solved by specifying the evaluation goal , the overall target can be divided to several basic index, each basic index has one result [4], The basic indexes can be set according to the actual design, the project can be observed and measured. Through this method of score, it can really reflect the actual situation involving an individual in the course design, avoiding mistakes in grading or score by impression.

The basic standards of assessment include attendance (20'), hands-on ability (30'), designing instruction (30') and performance of oral defense(20'). Attendance can objectively reflect the present situation and working

attitude of students and is beneficial to arouse students' positivity in study. Hands-on ability can tell whether the student is creative and fit for the standard. Designing instruction can show whether the designing process is reasonable or not, whether the calculation is accurate and detailed, and also it can show the format is correct or not. Following the design, oral defense is underway. We should make further efforts to check and sum up the understanding and application of theories, concepts and approaches which are used in the curriculum designing by the students. We should know well the extent and the capacity of students in finishing the curriculum independently. According to the answers to the questions that are raised by teachers, we can understand the students' attitudes to the designing, creativity and their abilities better.

4. Develop the advantage of curriculum designing and improve students' comprehensive quality and ability

4.1 Improve After choosing the designed titles, students have to prepare proper reference books and depend on the materials to work out the design process.

With the usage of design data, students can obtain some methods of data searching. It is also very useful to develop the students' ability to analyse and solve problems, more over, to get further familiar and understanding about the relative science and technology. students' data retrieval ability, make them study how to search and use the data.

4.2 Improve the students' capability of practice

During the process of curriculum-design, students have to work out reasonable design proposal based on the algorithm analysis. Students also have to do necessary complex analysis. While doing the designing, students can arrange the designing process reasonably, which is according to the designing requirement. The above independent design work is very important for the students to improve their capability of practice. It also has built the solid foundation for the graduation project and future work.

4.3 Cultivate students' capability of independent working and innovation

The content involved in curricular arrangement won't be totally the same as what to be taught in class. The students are required to make use of textbook knowledge according to subjects and sources provided by the teacher, and finish the designed task independently, which will avail themselves of good opportunity to self-study and work ability. Students have to study and explore constantly in curriculum-design, trying to find methods to solve the problems by themselves. This process, whose result is evident, is a learning process of innovation. The key to the designing process is that it can create the design teaching atmosphere new and original for the students, and it can give standard guiding opinions in the whole. As for how to realize it, it is better to let the students develop freely to arouse students' creative potential.

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