

# Analysis of the current situation of the construction of computer programming laboratory courses in management disciplines

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## Abstract

In the background of the era of big data, computer programming laboratory courses are an important category of laboratory courses commonly offered in management disciplines, taking the marketing major of GUET as an example, the Python laboratory course was offered in the second semester of the sophomore year. Because programming itself has its own independent theoretical system, the requirements for the way of thinking of the learners are also special, the requirements for logical thinking are very high, and the requirements for the practical development of a high ability. Therefore, it is difficult for most students to adapt to the requirements of the course, and the learning process is painful, and the teachers' teaching is difficult to achieve the desired effect. Therefore, programming laboratory courses have become the object of consideration and research for many front-line teachers, and there are many studies and results around this kind of courses. This paper examines the problems and causes of the current computer experimental course construction and proposes solutions to provide some reference for the development of experimental teaching in computer programming courses.

## Keywords

Programming, experimental teaching, teaching mode, blended learning.

## 1. Research Background

With the rapid development of computer technology, computer application ability has become an important part of the knowledge structure of modern people. Both computer science students and non-computer science students must strengthen the teaching of computer science to cultivate their ability to analyze problems with their brains and solve problems with their hands. It requires students to use the basic theoretical knowledge of computer and basic operation methods to complete computer experiments, so as to improve their computer application ability.

With the development of computer disciplines and the requirements of the information society on the quality of talents, the traditional experimental teaching process of the course has revealed many shortcomings. When carrying out the experimental teaching of computer courses, there are problems such as random arrangement of experimental contents, lack of standardized guidance, reliance on teachers' personal teaching experience, relatively single and backward teaching methods, more verification experiments and less creative experiments, disconnection between teaching contents and practical applications, students generally do not pay attention to experimental classes, and the current team of teachers engaged in experimental teaching, young teachers and In addition, there are some deficiencies in teaching experience. Therefore, it is necessary to conduct an in-depth discussion on the experimental teaching process of computer courses, analyze its basic process and characteristics, and then

put forward a generalized teaching model and procedures to provide some reference for the development of similar experimental teaching.

Classification and characteristics of computer software courses According to the characteristics of computer software courses, they can be divided into the following three kinds

(1) application software courses, such as video, audio processing, graphics and image processing, web production, day production, multimedia technology and other courses. Generally for one or more designated application software, explain its basic working principle, the operation of common functions, operating instructions, operating techniques and comprehensive applications. Such courses require a high degree of proficiency in the actual operation, generally require students to be able to quickly correspond to the lecture content to the operation, and can use the basic operation to solve practical problems.

(2) programming courses, such as Python language programming, assembly language programming and other courses. These courses are both theoretical and practical, requiring students to read, analyze, design and write programs on the basis of their understanding of the language, while the ability to solve practical problems with computer language is also high.

(3) computer principles courses, such as operating system principles, database principles, computer network principles, computer composition principles, compilation principles and other courses. Such courses to teach the principles of the main, requiring students to fully understand the principles on the basis of the principles of simple expansion and application of raw courses both principles and practical operations, but from the top to the bottom of the operational decreases in turn, theoretical increases.

## 2. Characteristics of programming laboratory courses

In this study, the main object is to investigate the process of experimental teaching in the multimedia network classroom environment, and to treat most of the teaching and practice processes in the course as experimental classes, except for the basic theory. This type of course is representative of computer software courses, and the research results have greater generalizability. The experimental programming courses are both theoretical and practical, and are mainly aimed at practical application, which is a very important category of computer courses in universities.

The basic goal of programming laboratory courses is to cultivate students' programming ability. Programming course includes three important knowledge modules: one is the language knowledge, two is the programming method, three is the algorithm. In these three knowledge modules, computer language in the bottom of the programming, is the basis of programming and tools, is the key to mastering programming technology programming methods in the middle of the programming, is the premise of the development of correct and reliable software, shorten the software development cycle, and then extend the use of the software cycle of the important means algorithm in the top of the programming, is the rules of problem solving, is the core of programming. The core of programming.

Based on this understanding, the experimental course of programming should take the linguistic knowledge as a skill to cultivate, and the programming method as a rule to follow the current problems in teaching the experimental course of programming. In the limited class time not only need to teach a large number of basic knowledge and basic concepts, but also to teach specific applications and even operations.

In the traditional teaching methods focus on the teacher's lecture, the introduction of the concept, often according to the "proposed concept - explain the concept - examples," the order, suitable for teaching relatively stable content of the subject. The distribution of knowledge or technology points of computer application courses is network-type rather than linear, learners can start from any point, the learning order is not strictly defined, so its knowledge system is

more difficult to grasp. In recent years, although the teaching method has changed from "chalk blackboard" to "computer ten screen projection", the teaching method still mostly follows the traditional classroom lecture method. At the same time, the use of multimedia technology can be teachers, teaching materials, the use of knowledge and other links into one, through the computer will be vivid content, realistic image data and other comprehensive information transmitted to students, due to the increase in the amount of information, but make students learn more clueless. Students lack autonomy in the whole teaching process, and they usually repeat the teacher's operation process, as long as the same result can appear, not knowing the real meaning of the operation. The practical operation level, comprehensive analysis ability and innovation ability of students cannot be assessed.

### 3. The current situation of domestic and foreign research

There are a number of domestic and foreign studies on the experimental teaching of computer software courses, but the depth and direction of the studies vary. At present, there is less literature about foreign related research, from the available information, foreign research on the application and development of multimedia network classroom is relatively mature, there are also some products for local area network teaching, but less research information on computer software courses experimental teaching, its mode and method can not be fully suitable for China, especially the promotion and application of relatively economically backward areas. For example, class size, teaching hardware conditions, teachers' knowledge background, students' selection system, and students' characteristics are different from those in China. Therefore, this study did not refer to foreign research results. From the literature, the research on computer experimental teaching in China is still in the initial stage, especially the research on the experimental teaching of computer software courses, which is generally studied as the same object or auxiliary process with the classroom teaching process, and the research on upgrading it to an independent experimental course has only started in recent years.

At the same time, the existing theories and methods of computer experimental teaching are extended and developed from the traditional science and engineering disciplines, and still have strong experimental characteristics of science and engineering, which are not well used for the guidance of computer experimental teaching. In the domestic related research, mainly including the following aspects of computer laboratory construction and management, experimental teaching platform development, experimental teaching model research and process management, school-based or regional experimental teaching research, etc., this study is based on the experimental teaching model research and development. From the available data, most of the domestic experimental teachers engaged in the experimental teaching research of computer programming courses are front-line computer laboratory teachers, and the results of the thesis are mostly from the front-line experience. The thesis results of the experimental process description or too specific, such as too much involved in student characteristics, teaching content, hours and other details, can not be well promoted and applied or too general, such as a series of broad principles and ideas, but the lack of operational procedures, can not be directly used to guide the practice.

### 4. Several basic experimental teaching modes

#### (1) Case teaching method

The case is the core of case teaching, without the case, case teaching can not be talked about. The so-called case is for certain teaching purposes, around a selected issue or several, with facts as the material and the preparation of an objective description of an actual situation. The case teaching method can be traced back to the ancient Greek and Roman times, but it really

originated from Harvard Business School as a teaching method and has a history of one hundred years, and after a long period of teaching practice, it has formed a unique teaching method and become one of the important methods of teaching. With its advanced teaching concept and vivid teaching method, the case teaching method has now been promoted to many courses outside of modern teaching and has become an irreplaceable and important method. Under the guidance of teachers and according to the requirements of teaching purposes, the case teaching method organizes students to analyze problems and solve problems by investigating, reading, thinking, analyzing, discussing and communicating with them, so as to improve their ability to analyze and solve problems, deepen their understanding of basic principles and concepts, and make them fully understand the complexity, variability and diversity of problems. (2) Task-driven teaching method

#### (2) Task-driven teaching method

Task-driven teaching is a quality education model based on constructivist learning theory and modern educational technology, which aims to stimulate and cultivate students' interest in learning. The so-called "task-driven" means that students complete the tasks set by teachers through independent learning and mutual cooperation, and construct their own knowledge and skills. The process of training students to complete learning tasks is a process of constantly asking questions, solving problems and constructing knowledge.

#### (3) Computer-supported cooperative learning teaching mode

It has been confirmed that different forms of learning affect the learning effect of students, and the knowledge that students can absorb in the combination of watching, listening, speaking and doing can be achieved by adding the process of teaching others. Therefore, the best learning effect should be achieved when the learners establish a relationship of mutual guidance and support, and when they learn from each other and pass on their experience. With the support of modern information technology, this ideal learning is being realized through the "computer-supported cooperative learning" teaching model. Computer-supported cooperative learning, for short, is the use of computer and network technologies to assist and support cooperative learning. Multimedia can provide an interactive learning environment with friendly interface and intuitive image, and network technology can provide a channel for information transmission between learners, break through time and space restrictions, and also organize and present subject knowledge and various teaching information in a hypertext and hyperlink way. These features provide unprecedented opportunities for the development and application.

After the above analysis, the advantages of the three teaching modes can be combined to form a new teaching mode. The new model has a very clear pedagogical purpose, which is to master the basic content and methods of programming, and at the same time to acquire the skills related to it and to improve the ability of inquiry learning and innovation. In this teaching mode, students study and imitate the case in a real integrated environment, analyze the tasks associated with it, discuss and communicate in groups, and finally not only complete the tasks, but also construct the corresponding knowledge system, master the corresponding operation methods, and exercise the cooperation and communication skills in the process. Therefore, the new teaching mode should be transformed from teacher's "teaching" to student's "learning", follow the characteristics and methods of case teaching when selecting and presenting the case procedure, fully resonate with the role of the case in the learning process, emphasize the task. In the process of learning, we emphasize the realization of the task, and let students get the ability to exercise while completing the task in a targeted way.

## 5. Problems in the traditional teaching process

From the teaching process records and analysis, it is easy to find that there are many problems in the existing programming teaching, which directly lead to the poor teaching effect and

deviate from the requirements of teaching objectives. The problems in the teaching arrangement Because the writing and debugging of general programs are time-consuming, it is unlikely to complete the design and writing of a complete case in two class hours, excluding the time for knowledge explanation, which is a great limitation to the teaching arrangement in class. Therefore, increasing the amount of class time is the first step to improve the effectiveness of programming teaching. Problems in the teaching environment [, the current computer room environment generally contains projection or screencast teaching software, teacher and student machines, which can complete the main teaching process, but lacks some supporting environment for teaching. In the case teaching process, students will produce many temporary files, such as downloaded materials, case materials, completed programs, unfinished program fragments, etc. The computer room should provide students with personal network storage and shared storage space for the course, so as to facilitate the continuous development of cases and accumulation of teaching resources in the teaching process, as well as to provide convenience for resource sharing in cooperative learning. In the process of cooperative task-driven teaching, students need a perfect online communication platform to strengthen the cooperative development in the task, and record the complete cooperative communication process to realize the process tracking of cooperative learning. On the other hand, the online communication platform can also provide a good communication channel between teachers and students, and provide convenience for answering questions after class and online guidance for semester work.

## 6. Problems in theoretical lectures

Before the general theoretical knowledge lecture, students lack the necessary pre-study of the new knowledge, and when the teacher conducts the new knowledge lecture, students can only passively listen and memorize, and the effect of their memory and understanding is poor. This requires the teacher to set some targeted pre-study tasks after class, through the completion of these tasks, students establish a basic understanding of the new knowledge, understand the main content structure and ideas, and have some intuitive understanding and a memory, which is very important for the mastery of new knowledge and rapid application. In the process of teaching theoretical knowledge, there are still some problems such as rigid teaching methods, inappropriate selection of teaching examples, organization and logic is not strong. To solve these problems, teachers are required to carefully analyze the content to be taught, choose the best teaching method, and be flexible according to the actual situation in the teaching process, and choose appropriate teaching examples, which should fully demonstrate the principles of new knowledge and application methods, but not too many interfering factors, i.e., strong relevance, while the rationality and logic of the lecture depends more on the teaching ability of teachers, and needs to be It is necessary to sum up the experience in practice and strengthen it gradually. The main teaching process of programming course is related to cases, but the current selection of cases in most teaching process is not reasonable enough, as shown in the following points The range of knowledge points covered by cases is not ideal, some cases cannot practice all new knowledge, while some contain too much old knowledge, too much interference is needed to complete the cases, and the need for cases is not strong. The selection of cases in different teaching stages is not reasonable enough and does not reflect the different requirements for cases in each teaching stage. For example, there are great differences in the requirements for cases in each stage, such as knowledge lecture, case practice, cooperative task and semester work, etc. The selection and design of cases must be developed for different requirements.

Cases are not practical and interesting enough to motivate students' learning. Practical cases can help students to learn by example, to build new programs quickly with old codes or to solve

practical problems related to daily life. Interesting examples can attract students' attention and motivate them to learn, which can achieve twice the result with half the effort. The cases are not deep enough, lack of extension, do not provoke students to think more, and are not attractive to capable students. Students feel that there is no space to think and explore in such cases, so they may do it perfunctorily, which is not conducive to cultivating students' independent thinking and innovative ability. The cases are old and not updated. Outdated cases cannot arouse students' interest in learning, nor can they adapt to the changes in students' ability and knowledge background. For different grades, different specialties, and different abilities of students, corresponding cases should be developed for teaching, which also puts forward higher requirements for teachers' programming ability and awareness of teaching updates. The problems in the cooperative task are that most teachers give up this good form of learning because the cooperative programming task has high requirements on students' individual ability, teachers' guidance and management ability, and the selection of tasks. In this way, the training of students' ability and sense of cooperation is missing, as well as their experience in the design, development and management of small projects, so that students are unable to start when facing real problems or projects. The most direct impact is the lack of experience in project development and cooperation with others, which makes the completion of the graduation design process more difficult.

**Problems in after-school communication** Generally, teachers seldom establish after-school communication channels with students, and even if they do, they only have occasional emails and chats, which cannot relieve students' questions in the learning process in time and are not conducive to teachers' timely understanding of students' ideas and learning process. Especially in the process of collaborative tasks outside the classroom, timely teacher-student communication can guide students' collaborative process and make them use the right methods and ideas to complete the tasks.

**Problems in the course evaluation** The course evaluation should be able to reflect students' learning in all aspects and judge their ability to remember, understand and apply knowledge, while the programming experiment course focuses on their application ability. In the design of course evaluation, most teachers evaluate in a single way, focusing only on the memory of common codes and the repetition of teaching cases, which can not reflect the real ability of students, and can not highlight the students' comprehensive application of knowledge. Due to the above problems, the actual teaching effect of programming experimental courses is not improved, and most students generally reflect that programming is difficult to learn and understand, and the learning effect is not very satisfactory.

## **7. Implementation of computer experimental teaching under the new model**

Under the guidance of "mixed experimental teaching mode", I took a section of the experimental course "Python Language Programming" as an example and designed a systematic teaching process as follows. The teaching process is designed as follows. The teaching objectives are to enable students to master the basic functions and usage of each control. To enable students to write simple applications using several basic controls. To enable students to understand how the timer works and to develop timekeeping programs using stone controls.

### **7.1. Teaching focus**

The teaching focus is on the common properties, methods, events and functions of the form and several controls. The teaching difficulty is to develop timekeeping programs with controls.

### **7.2. Teaching Environment**

Prepare a multimedia room environment, network environment, and screencast teaching environment to support teachers' lecture and students' practice. Students' personal network

storage and course shared storage are used to save teaching process data. The task-based assignment management platform is used for post-class assignments and post-class tasks release, process management, submission and evaluation.

### 7.3. Formative evaluation

Students are evaluated on the completion of classroom tasks, and the program completion results are scored from five aspects: program function, interface appearance and operation, code specification, programming skills, and functional innovation. The program completion process is scored from three aspects: proficiency, completion time, and active questioning and thinking. If the class size is large, a sample of students can be selected for evaluation, or a basic evaluation score can be set for most students, focusing on the poor and outstanding students.

### 7.4. Assignment after class

Before the end of the class, assign this lesson's post-lesson homework using the counter control to design a countdown clock, that is, in the form through the text box to enter the number of hours, minutes, seconds countdown, click the start button, in the label dynamically display the current countdown time, when the time is over, with the label color flashing and the form shaking to remind the user's attention, click the stop button to stop reminding the request in the next Click the stop button to stop reminding the user to upload the completed program source code to the assignment system before the next class.

## 8. Conclusion

Computer programming laboratory course is an important class of courses commonly offered by management majors, because programming itself has its own independent theoretical system, the requirements of the learner's way of thinking is also relatively special, the requirements of logical thinking is very high, while the requirements of practical development ability is also very high, so most students are difficult to adapt to the requirements of the course, the learning process is more painful, the teacher's teaching is also difficult to It has become a course that teachers and students generally find difficult to learn, understand and teach. Therefore, the experimental course of programming has become the object of consideration and research for many front-line teachers, and there are many studies and results around this course. This study mainly discusses the process of experimental teaching in the multimedia network room environment, and integrates a variety of existing teaching methods to meet the development and requirements of the experimental programming course, and forms a generalized teaching procedure and model that can be operated to provide some reference for the experimental teaching of computer programming courses.

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