

Typical Case of Digital Teaching of C Language Based on the Whole Process of Academic Evaluation-Understanding C Language Program

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Abstract: "C Programming Design" is an important professional basic course for students to opens the door to the intelligent world in the future. The teaching case takes the teaching process of "Understanding C Programming" as the carrier, designs a modern digital technology teaching case based on the OBE idea with the students as the center and the whole process of academic evaluation as the link. The design of the teaching case integrates online and offline teaching, builds a new five-in-one teaching system integrating education idea, teaching goal, teaching resource, teaching method and teaching evaluation, so as to achieve the goal of improving teaching efficiency and talent development quality. Finally, the implementation effect of the teaching case and the problems existed are analyzed, and the continuous improvement measures are proposed.

Keywords: Whole process of academic evaluation; OBE idea; Teaching method; C language.

1. Introduction

Han Yu of the Tang Dynasty said, " In ancient times those who wanted to learn would seek out a teacher, one who could propagate the doctrine, impart professional knowledge, and resolve doubts." The teaching method in China can be traced back to the study of Confucian classics era of the Han Dynasty. To this day, the "full classroom inculcation" teaching model still flourishes. Students have "low rate of heads up" in the classroom, and even "some students play games, sleep and fall in love every day" [1]. This reflects that the current university classroom is not attractive to students, teachers tend to focus only on "teaching" and neglect students' "learning", and cannot carry out teaching design and practice around students. In order to meet the needs of modern society for high-quality talents, the country pushes ahead in the teaching reform based on modern science and technology. This paper takes "Understanding C Programming" as an example, designs a modern digital technology teaching case based on OBE idea, which focuses on student and takes the whole process of academic evaluation as link. Some inspiration is obtained through the implementation, analysis and summary of the case, which lay a solid foundation for the next step of teaching reform.

"Five-In-One" Typical Design of Digital Teaching Cases Based on the Whole Process of Academic Evaluation

First of all, the teaching goal of C language is to develop new high-quality compound engineering talents with strong practical and innovation ability, global sense and lifelong learning ability, which are needed by information industry and society [2]. "Understanding C Programming" is the first teaching content of "C Programming" of freshmen in 2022. The design of the teaching case is carried out around the general teaching goal.

1.1. Student-Centered Case Design Idea Based on Whole Process of Academic Evaluation

University teaching is to help students build specific professional cognitive models in their minds [3]. "Learning"

is that students build cognitive models in their own minds, and "teaching" is that teachers helping students build cognitive models [3]. Then, how to promote and supervise students' learning becomes the core of case design. As a teacher, in addition to stimulating students' desire in learning and building their learning faith, the corresponding evaluation mechanism must be designed, and the scientific evaluation mechanism is a strong backing for urging and forcing students to become the main body of teaching. The traditional evaluation is that "one paper in final exams" determine students' academic achievement, which has chance and one-sidedness, cannot supervise and evaluate the whole process of students' learning, and is not conducive to the evaluation and cultivation of students' abilities. The whole process of evolution mechanism is used to evaluate students' learning goals before, during and after class, this has a certain pressure on students' learning, promote the learning motivation, make students can change from "want me to learn" to "I want to learn", they become the masters of learning, actively complete the learning goals and tasks, and achieve all-round improvement of their abilities and qualities. To achieve this goal, the case design must make students clear what the learning goal is, what contents to learn, what abilities to develop, and how to achieve the learning goals.

1.2. Setting of Ability-Oriented Course Goals

OBE emphasizes three core idea, which require focusing on student development, outcome-oriented education (namely students' problem-solving ability), and a sound continuous improvement system namely feedback based on systematic evaluation and improvement based on evaluation) [4]. "Understanding C programming" is the first lesson of "C programming", and students must be made to clarify the "knowledge goals", "ability goals" and "quality goals" and "quality goals". To this end, first, the case designs an introduction to the course "Understanding C Programming". Learning goals and learning problems are proposed through the introduction, make students have a "navigation light" for learning, which indicates the learning direction and lays the

foundation for the teaching introduction of "Understanding C Programs". Prepare lessons are mainly for the introduction of classroom contents, expanding students' knowledge, developing students' independent analysis, problem-solving ability and innovative thinking, and laying the groundwork for the realization of teaching "high order, innovation and challenge".

1.3. Building Online and Offline Digital Teaching Resources That Cover Before, During and After Class

With the learning objectives, the next step is to create learning resources, so that students have learning "contents". Relying on the Rain Classroom platform, a digital teaching resource library is built online and offline, covering before, during and after class. The resources before class include MOOC videos, courseware, and preview homework; resources during class include "student lecture" courseware, teacher summary courseware and class test exercises; resources after class include homework after class and course design, etc. The resources before class are used for learning and evaluation, students are guided to basically achieve their learning goals; during the class, students can improve their reaction ability and communication level through students' lectures and discussions, and consolidate their basic knowledge. Through the teacher's summary, homework and course design, students can expand the breadth and difficulty of learning, achieve high order, innovation and challenge of learning, and cultivate students' comprehensive ability and high-level thinking to solve complex problems.

1.4. Project Teaching Methods Based on Digital Technology

Relying on the project, we make full use of modern information technology, adopt flexible and advanced teaching methods such as blended teaching, case teaching, PBL (problem-based learning), carry out heuristic teaching, interactive communication and inquiry discussion, introduce Proteus simulation software to stimulate students' interest in learning and enhance their learning motivation, so that Teaching benefits teachers as well as students. According to the course goal of "Understanding C Programming", two teaching projects are set up.

- 1). Framework structure of C programming (What does C programming looks like)
- 2). DevC++ compile software application (How to use C language)

1.5. Building Multi-Subject and Whole Process of Academic Evaluation System

The three in one evaluation target system of knowledge, ability and value is built, the evaluation approach of multi-subject such as teachers, students and society is used, the teaching and learning process collection based on big data is explored, the whole learning process of students is recorded, the value-added evaluation teaching links are increased, and the internal driving force of students' learning is stimulated. The whole process of preview before class, discussion during class, lecture, test in class, unit test, final exam and homework are incorporated into the academic evaluation system to truly assess and evaluate the whole learning process, promote students' learning enthusiasm and initiative, and cultivate students' abilities of communication, exchange, independent

thinking and innovative thinking.

2. Case Implementation of Three Stages Before, During and After Class

2.1. Preview Before Class Stage

- 1). Release the Teaching Principles of "C Programming" and the Regulations of the Whole Process of Academic Evaluation

Make students clear that the basic principle of teaching is student-centered and they are the main body of learning; understand that the final grades depend on the whole learning process and is no longer determined by the traditional "one paper", they must pay attention to the learning process and complete all learning tasks.

- 2). Release the Course Objectives of "Understanding C Programming"

The purpose is to let students know the teaching objectives of this course, with objective, they have a direction to work hard. Furthermore, two learning tasks or projects are built to accomplish the knowledge, ability and quality objectives.

- 3). Release MOOC Video Courseware and Student Lecture Courseware

Students can watch classical MOOC video and preview the courseware to introduce the course and prepare for the course learning and lecture; complete the learning of basic knowledge of the course and achieve the basic course objectives.

- 4). Release Preview Assignments and Test Students' Preview Effect

Preview assignments are conducted in the form of exams with a limited completion time, the purpose is to test the preview results of students and lay the foundation for teachers to establish key analysis contents in class.

2.2. Classroom Teaching Stage

- 1). The Teacher Analyzes the Students' Preview Situation, Propose the Problems in Preview, and Students Discuss

Most students have positive attitudes and complete the preview assignments seriously, individual students do not have positive attitudes and do not complete the assignments seriously. The objective question system automatically marks exam paper, there is an error in the exam score of several questions, students' grades should be added 20 points to the final preview grade on the system grade.

- 2). Organize and Guide Students to Get up on Stage and Lecture

The "student lecture" is the main innovative point of the teaching case, and also the difficult point of the case implementation. Since it is the first time to implement "student lecture", in order to ensure the effect of lecture and set an example for the later students to "lecture", teachers are required to prepare lecture materials, give simple guidance to the students with first-time lecture and put forward the basic requirements. The main purpose is to arouse students to learn on their own, exercise and improve their communication and response skills. Only when they have completed the basic learning objectives through preview and understood the basic points can they "speak clearly and plain". Students are required to try lecture in study groups, supervise each other and improve together.

According to the course contents of "Understanding C Programming", the courseware is divided into 4 knowledge

points, in the middle of the courseware, the rain classroom need to be used to insert the class quiz according to the knowledge points, students use mobile phones for classroom quiz, which can improve students' concentration in the classroom and demand achievements for 45 minutes in the classroom.

3). Programming Languages and Computers, Course Introduction Is Carried out Through Task Examples

The purpose of this knowledge point is to introduce the course. Learning a language cannot do without a computer, how a computer works, the three stages of programming language development, what type of data programming language must be transformed into for a computer to recognize and process, and the ultimate role of a program, we must let students have a basic understanding and introduce them step by step. In order to improve teaching effect, after students finished the basic contents, the teacher applied two tasks for summary and improvement. One illustrates that the program language is compiled to reach .exe binary application file; the other make students understand the program language is compiled to get.hex binary file can be copied into the chip to achieve intelligent control through the Proteus simulation software, so that. Students understand the specific role of C language through the two tasks, the introduction of Proteus simulation software make students to see the process of the program language to control the hardware, the many variations of LED lights stimulate students' interest in learning C language.

4). Introduction to C Language, Combining the Contents of Textbook and Introducing Ideological and Political Theories Teaching in All Courses

Understanding the development history of C language, learning features, methods, online learning sites, introduction to materials, etc. After the students' explanation ends, the teacher emphasizes the inspiration brought to us from the great contribution of ken and dmr in inventing the C language and the Unix operating system: dare to think, to be good at what you do, and to have goals that may lead to success through hard work!

5). Framework of C Language Program

This is the key point and difficult point of this class; the purpose is to let students master the C program structure and learn to write simple C programs. In order to make students explain clearly and listen clearly, increase the number of pages when designing the courseware, one page illustrate one part of the program framework, and introduce separate explanation on the courseware. After the introduction of the program structure, the program writing specifications are emphasized to reach the requirements of the quality objectives.

6). Methods and Steps of Running C Program

Introduce the application of DevC++compiler software, and master the steps and methods of editing, compiling, connecting, and running C programs with DevC++compiler software.

2.3. Teacher Summary and Improvement

(1) The simplest C program structure (only the main function); simple C program structure (including the main function, user-defined function); general C program (including the main function, multiple C source files, multiple functions), from simple to complex, guide students to understand the need to lay a good foundation, and gradually improve the depth of learning, difficulty, and develop towards

high order, innovation and challenge.

(2) How to make the .exe file compiled by oneself run independently? Solve the problem of running crash in .exe files. Guide students to use online resources to improve and expand their learning breadth and depth. Solution, introduce the header file `#include <windows.h>` in the program, and call the function `system("pause")` in the main function.

(3) Students are guided to set programming ideas by using the example of "programming 1+2 and outputting the result" through DevC++. According to teaching experience for years, most students have no idea how to start because they are first introduction to programming languages, therefore, simple examples are used to guide students to overcome their fear of difficulty, gradually build programming ideas and set programming confidence, and lay the foundation for further learning.

(4) Using the Internet to Assign Homework in the Rain Classroom, and Developing Towards "High Order, Innovation and Challenge"

According to the case assumption, after the preview video, courseware, homework, classroom lecture and discussion, most students have mastered the basic knowledge and have the simple programming ability. The homework should increase the breadth and difficulty, so that students can exercise their programming sense and improve their programming thinking, and develop towards "high order, innovation and challenge". Therefore, the homework are mainly objective quiz questions and programming questions, and add homework without standard answers appropriately. In this section, the non-standard answer assignment is: after understanding the working principle of existing computers, please develop your imagination and design a new type of computer with a new principle.

3. Analysis of Case Implementation

3.1. Basic Effect of Case

In general, the case design is scientific and novel, students have a high recognition and active participation, their role change from "passive learning" to "active learning", have high concentration in class, and the learning effect is obvious. 70% of the students in the class of 2022 are above More than 70% of the students in the class of 2022 are above 80 points. More than 70% of the students' electronic information assignment of 2022 grade have more than 80 points.

3.2. Innovative Points of Case

1). New Idea

The whole process of academic evaluation pressure urges students to realize the role of the main body of teaching, from "want to me learn" to "I want to learn", students really become the main body of learning, the "student-centered" teaching has been implemented.

2). Scientific Case Implementation Path

The whole process of academic evaluation teaching realizes "student-centered" teaching and gives students the learning initiative; setting competency-oriented course goal gives students the direction of learning in the three aspects: knowledge, ability and quality; the construction of digital teaching resources gives students the path to reach the course goals: the project-based teaching of digital technologies provides a solid foundation for consolidating and improving students' knowledge, ability and quality. In particular, the students "go on the platform", which exercise and improve

their communication and reaction ability. The case path is highly implementable and easy to promote.

3.3. Difficult Points and Reflections in the Implementation of the Case

1). Quality of Students' Lectures

Since students do not have "lecture" practice, coupled with the first contact with C language, knowledge from learning to in-depth need to a process, so "lecture" quality problems are normal. In order to solve this problem, on the one hand, teachers should prepare lecture materials, simplify the content, and focus on the key points; on the other hand, teachers should urge students to actively prepare, study the knowledge points in depth, and speak and listen to each other as a study group in the dormitory to improve themselves from many aspects.

2). Promoting "High Order, Innovation and Challenge " Requires Teachers Spend a Lot of Time and Effort

The "High Order, Innovation and Challenge" is implemented in C language teaching, which must be combined with the practical applications in society, and needs to consider the social needs and the actual abilities of students. Programming languages have soft and hard roles, and both difficulty and depth need to be considered in a balanced way. Make sure that students can reach the target with their feet up, and they can't feel that they can't reach the goal. Therefore, it takes a lot of practice and energy to select and design teaching resources.

3.4. Key Points in the Promotion of Case Improvement

1). Relying on Digital Platform to Realize Mutual Benefit Between Teaching and Learning

The design purpose of the case and the goals to be achieved in the implementation process require good communication and feedback between teachers and students for conducting improvement and refinement. With the help of WeChat, QQ and digital teaching platform, we can build a good bridge of communication to ensure positive interaction between teachers and students and realize mutual benefit between teaching and learning.

2). Teachers should have the spirit of dedication

The design of course knowledge, ability and quality objectives, the construction of digital teaching resources, the implementation of project-based teaching methods of digital technology, and the design of the whole process of academic system all require a lot of time and effort, and the workload is not comparable to that of traditional teaching, therefore, it is impossible for teachers to achieve the expected effect and purpose without their persistent belief and enthusiasm for teaching reform and dedication.

4. Conclusion

This paper has discussed a five-in-one case design based on educational idea, teaching objectives, teaching resources, teaching methods, and teaching evaluation. The implementation of this case has achieved good results and explored a feasible path for the course reform of programming language. It is believed that after continuous teaching feedback, improvement and enhancement, it will be gradually improved and more scientific. This reform will bring a great impetus to the improvement of students' all-round quality and the promotion of new applied undergraduate teaching quality.

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