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Reform and Practice of Mixed Teaching in the Course of Python Programming

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Abstract. *In view of the complex teaching language of the current course "Python Programming", which affects the teaching effect, in order to solve the above problems, the mixed teaching reform and practice method of the course "Python Programming" were studied, and the object-oriented programming course teaching was studied. Through detailed analysis of problems and in combination with the characteristics of the Python language, emphatically from the choice of teaching content, teaching process and teaching methods, design, and discusses the specific teaching content division, and points out the problems existing in current teaching, and the effect of study on experimental test, the experiment proves, the Python program design course teaching reform and practice of the hybrid method in the process of practical application has achieved good effect.*

Keywords: *Python program, Mixed teaching, Teaching reform*

1. Introduction

Python's basic syntax is relatively simple, but mastering advanced features is still difficult. Python language is driven by the "Internet +" era, especially the application of big data, cloud computing, artificial intelligence, deep learning and other fields, highlighting its advantages[1-2]. "Python programming" course in the course of the teaching goal is: to cultivate the students using the Python language development ability as the starting point to solve the problem of all kinds of practical calculation, the Python language and program design method as the main content, make the students have used Python language development to solve the problem of all kinds of practical calculation ability, and cultivate the computer thinking[3]. The core course "Python Programming" is offered for college computer science and technology and related majors, which tells the basic knowledge of programming language and programming methods, introduces the ideas and methods of programming, and helps students understand the methods of solving problems by computers, that is, to cultivate the way of thinking by computers.

2. Reform of mixed teaching of Python programming course

2.1 Optimization of the Course System of Python Programming

In order to solve many problems in the traditional teaching mode of Python programming, combining with the close relationship between Python and artificial intelligence, this paper explores and tries an innovative teaching mode, and carries out the development and design of Python programming course from three aspects[4]. Firstly, the theoretical basis of the course development of Python Programming is studied through literature research method. Secondly, the course of Python Programming is developed based on the conceptual basis of the course development of Python Programming. Finally, through action research method, three rounds of teaching practice were carried out to summarize the experience[5].

On the premise of cognition of artificial intelligence, students' preliminary cognition of artificial intelligence is established through teaching demonstration and living cases[6-7]. In the choice of teaching content, because the Python Programming course is easy to learn and use, more time can be allocated to the more important object-oriented programming content. The choice of teaching content does not require students to have much programming foundation, and the teaching content can be adjusted flexibly according to the students' foundation[8].

The main contents of the Python Programming course include: An Overview of Python;

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Object-oriented programming (object-oriented paradigms, classes and objects, inheritance, overloading, polymorphism, abstract classes, interfaces); The template. Exception handling; File processing and serialization[9]. Design pattern; Design examples. Describes Python variables, expressions, inputs and outputs, functions, modules, strings, lists and tuples, statements, and the Python interactive development environment. If students have a basic course design, this course can be compressed into two hours[10].

2.2 Research on Teaching Characteristics of Python Programming

What sets Python apart from other languages, such as C, is the strict rules of syntax. In a Python program, the bounds of a module are determined by the position of the first character on a line. (In C, the bounds are defined by F}, regardless of character position.) Python maintains a clear and uniform style in the overall design, which helps programmers develop good programming habits and is easy to read and easy to maintain, thus winning a large number of users.

The main purpose of the course is to develop students' computational thinking, improve information literacy, improve students' ability to analyze and process information, and lay a solid foundation for the study of other disciplines. College students have limited time to learn information technology courses. In the process of choosing content, they will give priority to the syntax elements, object types, algorithms and standard library of Python language, which will lay a solid foundation for further study.

2.3 "Python Programming" Curriculum Reform Mode

The course content needs the principle of balance. The information technology course is comprehensive, which involves aesthetic arts, environment, mathematics and other subjects. The study of information technology requires students to use information technology knowledge to solve problems in real life, study and work, solve all kinds of problems encountered in other disciplines, realize the integration of information technology and other disciplines, and promote students' self-development. Information technology courses are very practical, so teachers should leave enough time for students to operate, strengthen theoretical knowledge, and improve the ability of information analysis and processing.

Highlight students' learning autonomy and enthusiasm, which is the process of students taking the initiative to find and solve problems. The advantages of project-based learning can be summarized into the following seven aspects :(1) Let students give full play to their autonomy; (2) Emphasize the integration of multidisciplinary knowledge; (3) Closely connected with real life; (4) It is beneficial to cultivate students' cooperative spirit; (5) It is beneficial to cultivate students' innovative spirit; (6) It is beneficial to improve students' ability to solve practical problems; (7) Let the students master the method of learning -- learn to learn. Therefore, in the "Python programming" course, project-based learning from a general need to be solve the problem or task, students explore the problem in the form of innovation team, teachers with the mentor, auxiliary or the identity of the team members involved in analysis of common problems, brainstorm to find a solution to the problem, through the communication coordination, begin the process of operation to complete work, let the students to form problem solving and the ability of autonomous learning.

3. The practice of mixed teaching in the course of Python programming

3.1 Hybrid Teaching Evaluation Algorithm of Python Programming Course

The scores of students in the first test are divided into r grades according to the principle of high to low, and then the initial vector N can be obtained according to the ratio of the number of students in each grade to the total number of people taking the test:

$$N = \left(\frac{m_1}{m}, \frac{m_2}{m}, \frac{m_3}{m}, \cdots, \frac{m_r}{m} \right) \quad (1)$$

Where: the number of students is m, and m_r Is I (I =1,2... R) The number of students at each level. During the execution of the program, the scores are divided into five grades according to the analysis of the scores. 1,2,3,4,5 represent the number of grades, and m_1~m_5 represent the number of students of corresponding grades respectively. After obtaining m_1~m_5, the initial vector can be calculated.

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Calculate the key codes of m_1~m_5. When the initial vector is calculated, the scores of students in the first exam have been divided into r grades. According to the same classification standard, the scores of the second exam have also been divided into r grades. The number of students whose grades have been changed is calculated, namely, the transfer frequency. Is expressed as a matrix, represents the number of students who achieved this grade in the first exam, then from grade I to grade J, and the transfer matrix P is

$$P = \begin{bmatrix} \frac{m_{11}}{m_1} & \frac{m_{12}}{m_1} & \cdots & \frac{m_{1r}}{m_1} \\ \frac{m_{21}}{m_2} & \frac{m_{22}}{m_2} & \cdots & \frac{m_{2r}}{m_2} \\ \cdots & \cdots & \cdots & \cdots \\ \frac{m_{r1}}{m_r} & \frac{m_{r2}}{m_r} & \cdots & \frac{m_r}{m_r} \end{bmatrix}. \quad (2)$$

According to the same standards, the students' first and second grades are divided into five grades: excellent, good, medium, pass and fail. According to the grades divided, the key codes of transfer matrix P are calculated. According to the obtained transfer matrix P, the students' learning progress can be preliminarily analyzed.

$$P_{ij} = \left[\frac{m_{32}}{m_3} \right] \text{-} m_{32} \quad (3)$$

m_{32} is the number of students whose test scores moved from Level 3 to Level 2, that is, they improved; And vice

$$\Delta P_{ij} = N * \left[\frac{m_{23}}{m_2} \right] \quad (4)$$

m_{32} represents the number of students whose test scores have shifted from Level 2 to Level 3, which means that this group of students has regressed. According to this idea, the progress matrix S is constructed from the transition matrix P:

$$S_{ij} = (i-j)^3 P_{ij} = \frac{(i-j)^3 m_{ij}}{\Delta P_{ij} m_i}, i, j = 1, 2, \cdots, r, m_{23} \quad (5)$$

S= (S_{ij}) R × R is called the progress matrix of transfer matrix P, and the value of (i-j) is used to adjust the weight and positive and negative of Sij. If (i-j) 3>0, the student is progressing, otherwise they are falling behind. E(s) is the expected learning efficiency calculated by the transfer matrix P

$$E(S) = \sum_{i=1}^{r} \sum_{j=1}^{r} S_{ij} = \sum_{i=1}^{r} \sum_{j=1}^{r} (i-j)^3 P_{ij} = \sum_{i=1}^{r} \sum_{j=1}^{r} \frac{(i-j)^3 m_{ij}}{m_i} \quad (6)$$

This method assumes that the learning efficiency of students is high: when a large number of students make progress, at this time 3 (i-j)>0, the possibility of E (s) being a positive number is relatively large; On the contrary, when a large number of students regress, at this time 3 (i-j)<0, the probability of E (s) being a negative number is greater. A positive number indicates that students have a tendency to make progress, while a negative number indicates that students have a tendency to regress.

3.2 Analysis of Practical Effect of Teaching Reform

Before proceeding with the development of the Python Programming course, it is necessary to have an in-depth understanding of the needs of students. After access to a large number of references, combined with the actual situation of the development of the curriculum, students from the start, the

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students on the opening of a Python Python program design course, the students' learning motivation, the student to the course content needs and learning style needs to design the questionnaire, five dimensions for Python Python program design course of development to provide the reference. The objects of this study are the students of senior one in Z university in N city. Five classes are randomly selected. In the process of teaching implementation, software and hardware resources are fully integrated, project-based teaching method is adopted, graphical programming and Python code one-click switching function of MBlock5 is utilized to give full play to comparative learning advantages, and the following procedures are followed: The introduction of the project - specific goals - the program logic analysis and programming using graphical programming rapid to see effect, switch to the mode of Python code to view the automatic generation of Python code, principle and relevant knowledge and interpretation of the code Python code programming practice to use Python code to implement project function, test implementation effect again - will write your own Python code and the system generated code line by line comparison analysis and project summary to guide students to improve project function, brainstorming relevance for the new project. Through periodic comparative learning training, students can not only quickly establish programming thinking, effectively master Python grammar, unconsciously understand object-oriented programming ideas, but also arouse continuous learning interest through intuitive and interesting visual effects. During the teaching process, students' feedback is paid attention to, the course assessment focuses on the process assessment, and the final assessment adopts the project system, which focuses on the evaluation of students' logic ability, comprehensive application ability of programming knowledge, planning and organization and practice ability, and encourages students to innovate

4. Conclusion

As the basic course of Python language programming is still in its infancy, some attempts and explorations have been made in the course teaching reform, which has received good results. Professional students are very interested in learning Python language. The teaching reform needs to be further deepened. One is to make full use of the existing online course resources and establish a credit teaching system that meets the needs of the course as soon as possible. The second is to change the current situation of homogenization of teaching cases, teaching mode regardless of major, research and analyze the professional characteristics and needs of each major, and develop teaching cases suitable for different professional needs. In the future, we will continue to take students as the main body, take training computer thinking as the orientation, actively explore the teaching reform of this course, and constantly improve the teaching quality, so as to cultivate more applied talents with information literacy.

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