



Research on Interactive Online Teaching of Python Language Foundation Course

Zhiwen Zhu*

Shandong University of Technology, Zibo, Shandong, 255000, China

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ABSTRACT

Python language, as one of the most popular programming languages, has become the preferred programming course in Colleges and universities. However, in traditional teaching, the dull and monotonous teaching of Python course leads to the low teaching efficiency of Python course and the unsatisfactory learning effect of students. Therefore, there is an urgent need for new teaching methods to improve classroom efficiency. Adopting Python interactive online teaching can not only improve the teaching efficiency of Python course, but also promote the reform of information technology course.

1. The present situation of Python Programming Teaching

At present, Python has become one of the most popular programming languages in the world. The main reason is that Python is open source and free, has rich net terminal resources, simple and beautiful language, and has a wide range of applications. In this context, it is very important for colleges and universities to actively set up and construct Python language foundation courses for non computer majors. However, in the traditional teaching, students of different majors in different regions and schools learn to use different computer teaching languages^[2]. Non-computer majors have a relatively shallow understanding of computer professional knowledge. The basis of their learning program design is to stimulate their interest in programming, cultivate computational thinking, apply what they have learned, solve specific professional

problems, and realize the integration of professional disciplines and computer technology cross fusion^[3]. Language programming learning is a long-term accumulation process, learning grammar is more complex and boring, many students in the learning process in order to write and run code need to spend a lot of time and energy, only teach in the classroom, so that the teaching efficiency is low. Many schools can not meet the requirements in the allocation of learning, which also leads to the students' learning effect is not ideal^[2]. Therefore, to carry out Python Programming Teaching in non computer majors, we need targeted teaching design.

2. Curriculum Orientation and Objectives

“Python Language Foundation” is a basic course for statistics major, involving Python syntax, data type, function, file operation, object-oriented, data analysis, data visualization, etc. Through the study of this course, students

*Corresponding Author:

Zhiwen Zhu,

Shandong University of Technology, Zibo, Shandong, 255000, China;

E-mail: 1028852891@qq.com.

can master the basic knowledge of Python development, have the basic programming ability of python, and basically have the ability to apply Python to solve practical application problems. At the same time, it also lays a good foundation for the subsequent study of data analysis related courses, which is of great practical significance to cultivate high-quality statistics professionals.

From the perspective of curriculum objectives, it can be divided into four levels:

Course objective 1: to train students to master the basic syntax, basic operation, basic concepts and programming methods of Python language.

Course objective 2: to train students' ability of modeling general computing problems and solving computing problems with Python programs.

Course objective 3: to train students to master the ability of scientific calculation and visualization using Python language.

Course objective 4: to train students' ability to design complex programs with modular thinking.

3. Interactive Online Teaching Design

3.1 Design Concept

Interactive teaching mode refers to the organic combination of teachers' guidance and students' autonomous learning, so that students' learning is transformed from simple memory, imitation and training into forms of autonomy, communication and exploration, so that students' personality can be fully publicized, and harmonious communication between teachers and students and students can be formed by adjusting the relationship between teachers and students and their interaction. The interaction and transformation of teaching factors form a whole, multi-dimensional and dynamic interactive teaching activity to produce teaching resonance and improve the teaching effect.

Online teaching is a teaching method based on network. It has many advantages and characteristics, such as spanning time and space, not limited by human and material resources, maximizing resource utilization, selective learning anytime and anywhere, autonomous behavior, interactive communication between teachers and students, personalized teaching, teaching management automation and so on. It is a great change of teaching mode^[1].

The implementation of interactive online instructional design in the course of "Python language foundation" is an important teaching reform to achieve the goal of creating a high-level, innovative and challenging course, as "Two Order and One Degree" golden course^[4].

3.2 Curriculum Content System

"Python Language Foundation" course to carry out online and offline, in class and extracurricular hybrid teaching mode, need to support rich curriculum resources, to provide a guarantee for students' autonomous learning. Using the "goal oriented teaching method", the teaching content is modularized, the knowledge points of each module are clear, and the guidance task list and learning materials are given. Each module is composed of "difficulty analysis", "case development" and "practice". Difficulty analysis is the core part of the course, reflecting the high-level; case development is the multiple interactive part of the course, reflecting the innovation; practice is the practical part of the course, reflecting the challenge^[4]. Urge students to preview before class. Before the beginning of each class, first introduce the learning objectives of this class and the tasks to be completed after the course learning, so that students can learn with tasks. In the process of teaching, we should guide students to ask questions, stimulate their enthusiasm for learning, cultivate their questioning and research spirit, enhance their autonomous learning ability, and promote their learning for practical use and innovative activities.

3.3 Interactive Program

Through the organic combination of classroom teaching, case teaching, online testing, after class exercises, broadcast class self-study and other teaching methods, we should fully reflect the student-centered concept in the teaching design, highlight the dominant position of students and the guiding role of teachers, promote the communication, interaction and cooperation between teachers and students, and comprehensively cultivate students' ability to solve and analyze problems, Improve the comprehensive quality of students.

3.3.1 By Asking Questions, the Interaction Between Teachers and Students Can be Realized

Questions are generally designed in the lead-in link before class and the questioning link in class. The pre class introduction is carried out in online teaching. Students are informed to read the syllabus and teaching calendar of the course before the class starts, make a reasonable learning plan according to their own situation, and encourage students to optimize the allocation of learning time, so as to do a good job of pre class preview. Provide students with rich teaching resources such as teaching courseware, micro video, Q&a discussion, course assignment, test paper library, online test, etc., list the key and difficult content, so that students can clearly find the direction and focus of

learning. Students are required to preview before class. The main work is to complete the task sheet with problems, guide students to think about problems actively, and come up with solutions, or take the problem to class.

As the teaching of Python language often involves the actual demonstration through computer operation, the combination of multimedia teaching and operation demonstration is adopted in classroom teaching to improve the amount of classroom teaching information and enhance the teaching density and breadth. Python language writing and application involves a large number of cases. Therefore, in the study of each chapter, targeted basic cases and expanding cases are designed. Combined with the corresponding knowledge points, different levels of problems are designed to stimulate students' curiosity and thirst for knowledge, so that students can solve problems through brain thinking, verbal communication, hands-on exploration and other ways, cultivate students' innovative consciousness and divergent thinking, and make students in the process of analysis. In the process of case study, improve the ability of integrating theory with practice, and cultivate the ability of independent modeling and design program.

In the process of interaction, teachers should make comments on students' performance. As long as the students put forward their views and opinions after serious thinking, teachers should encourage them. If they have innovative ideas, teachers should praise them. With the help of QQ curriculum group, the interaction between teachers and students in teaching can form a teaching environment with students as the main body and teachers as the assistant, which can more effectively complete the teaching content.

3.3.2 Establish a Learning Group to Realize the Interaction Between Students

There are also two kinds of interaction between online and offline. There are many ways to create online learning groups, which can be designated by teachers, generated automatically through the network teaching platform, or freely combined by students. After the establishment of the online group, it can carry out exploratory and communicative questions in the Q & a discussion area, so that students can speak freely, learn and discuss with each other, share high-quality resources, and express their views anytime and anywhere. Students can interact with each other through dialogue, discussion, debate and speech.

Online learning group teaching expands the teaching time and space, breaks the traditional teaching mode of real-time and closed teaching time and space, and can make full use of online education resources to fully implement

the teaching objectives.

In offline interaction, teachers should first design some practical problems with application value according to teaching objectives to stimulate students' desire for learning and exploration. In the group discussion, we discuss and exchange problems. When students encounter difficulties, the teacher should try to guide them to think and discuss together. When students are not clear, the teacher should give timely advice. In the process of discussion, each group should record the unresolved problems for further discussion. After the group discussion, each group sent representatives to report their work and show their works, and put forward their own difficult problems. Then they questioned, debated and supplemented among the groups, and finally summarized and refined the contents.

3.4 The Arrangement of Experimental Teaching

Combine classroom teaching with experimental teaching. Before the experiment, check the installation of computer equipment and software, make computer schedule, make clear to students the purpose and requirements of the experiment, the principle of the experiment, the operation process of the experiment, and design the cases corresponding to the knowledge points of each module. In the process of the experiment, each student should write the program by himself, and the teacher should inspect and guide, find and correct the problems in time, and demonstrate when necessary, so as to help students understand and master the operation and writing of the program quickly. At the end of the experiment, teachers and students or teachers make a summary, and students write the experiment report.

3.5 Students' Learning Suggestions

A. Focus on Python selection and loop structure, user-defined functions, numpy numerical calculation, Matplotlib data visualization, pandas data analysis and modeling.

B. We should read, listen, copy, write, think and ask more. Read more case codes in textbooks, learning reference books and various online learning resources, listen to teachers' interpretation of codes in class, copy, write, think and ask more about example codes inside and outside class.

C. We should attach importance to the combination of basic code and solving practical problems. On the basis of copying the existing reference code, we should learn to design code independently according to specific problems through a lot of practice and flexible use, and realize personalized settings, so as to improve our ability of statisti-

cal analysis of specific problems.

D. Pay attention to self-learning before class, pay attention to the self-learning task list and learning guidance issued by the network platform, and carry out self-learning through preview, watching micro video, learning exchange, problem discussion, review, data download, etc.

E. We should pay attention to listening and studying in class. Listen attentively and enter the learning state as soon as possible. Move your ears, eyes, mouth, hands and brain. Listen carefully, listen to the teacher's explanation and questions, and listen to the students' speeches. Eye to: reading textbooks, reading blackboard, reading ppt. Oral: retelling, answering questions, asking questions. Hand to hand: take notes, circle key points, do exercises. Brain to: use your brain, positive thinking, bold questioning.

F. Strengthen the review after class, strengthen the connection and comparison between the new and old knowledge, review and consolidate in time, and complete the online test, computer operation and homework on time.

4. Conclusion

Interactive online teaching improves teachers' teaching

efficiency and quality, arouses students' learning enthusiasm, stimulates students' interest in learning, reflects students' dominant position, and focuses on the improvement of students' autonomous learning ability, inquiry ability and innovation ability. It is an effective online teaching method^[4].

References

- [1] Liang Aihua, Wang Xueqiao, Xu Xinkai, et al. Learning centered python programming online teaching organization scheme [J]. *Computer education*, 2020 (11): 30-34.
- [2] Huang He, Sun Jing, Zhang Siyuan. Discussion on computer teaching based on Python language programming [J]. *Digital communication world*, 2019 (07): 269.
- [3] Xu Chaoxia. On the construction of Python programming teaching system for non computer majors [J]. *Software Guide (Educational Technology)*, 2019,18 (02): 48-50.
- [4] Xin Li. Research on interactive online teaching of Python Programming Course [J]. *Fujian computer*, 2020,36 (09): 134-136.