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Exploration of Blended Teaching Mode in Python Programming Course

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Abstract

Python is a free, cross-platform, easily extensible, and concise programming language, as well as a suitable tool for data analysis, mining, and visualization. In response to the teaching situation of Python programming courses with strong practical experience, limited class hours, and differences in student levels, various teaching methods such as online learning, group projects, and case teaching are integrated to enable students to acquire more comprehensive knowledge and skills in their learning. The practical results show that blended teaching mode helps promote teachers' auxiliary "teaching" and students' active "learning", effectively stimulates students' learning interest, cultivates their practical application ability and teamwork ability, and achieves good teaching results.

Keywords

Python Programming, Blended Teaching, Teaching Methods.

1. Introduction

The traditional teaching method usually involves the teacher giving lectures, students listening to lectures, and completing homework after class. From elementary school to middle school and then to university, this "passive learning" training mode is basically adopted, and students lack space for thinking about problems. The traditional teaching model regards all students as the same individual, adopts the same training mode, and teaches the same content, ignoring the differences in individual interests, basic levels, abilities, and other aspects, and does not effectively combine large-scale education with personalized education.

With the continuous development and application of information technology, emerging technologies such as big data and artificial intelligence have penetrated various industries, and more and more educators are implementing blended teaching. Blended mode teaching combines traditional face-to-face teaching with modern technology, making learning no longer limited by time and space and creating a more autonomous, interactive, and interesting learning environment for students. It will become the mainstream mode of classroom teaching in the future.

Python Programming is a very practical course, which has been widely used in data analysis, network crawlers, machine learning, artificial intelligence and many other fields. In recent years, many colleges and universities in China have successively opened Python programming courses. Traditional Python programming courses often focus on a certain textbook, impart knowledge, and it is difficult to achieve a high learning effect. The blended teaching mode can establish a course resource library by collecting stories, pictures, videos, and literature through the Internet and other resources, make full use of the existing resources to broaden the learning channels, and achieve the multi-dimensional combination of online, offline, inside and outside classes. Therefore, taking the Python programming course as an example, this article elaborates on the blended teaching framework from the aspects of teaching objectives, teaching resource

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construction, design and implementation of blended teaching mode, and course assessment methods in order to achieve sustainable development and optimization of course construction, and provide learning resources and references for teachers and students of similar universities.

2. Python Teaching Objectives

The Python programming course is an important foundational course for cultivating professionals in the fields of computer science, big data, and electronic engineering. Through the teaching and practical aspects of this course, students will master a popular advanced object-oriented programming language. The teaching objectives of the course mainly include the following aspects [1, 2]:

(1) Knowledge objective: To understand the basic knowledge of Python language programming, master the basic methods, theories, methods, and applications of programming, master the relevant basic provisions of advanced programming national standards, be able to consult relevant national standards and manuals, and develop good habits of strictly complying with and implementing various provisions of applicable national standards.

(2) Ability objective: Through course learning, students will be able to use Python to design programs correctly and proficiently; Ability to read and write complex programs; Ability to use Python to solve practical application problems; Have a certain ability to explore and reflect on knowledge, as well as innovative consciousness; Capable of self-learning and team collaboration.

(3) Quality objective: To cultivate students' abilities in computational thinking, innovation, and the ability to identify, analyze, and solve problems; Cultivate a rigorous scientific attitude and a scientific spirit of seeking truth, practicality, and rational thinking.

In addition, the combination of online and offline teaching modes will serve undergraduate students in various related majors of our university, as well as university teachers who want to conduct blended first-class course teaching online and offline, providing learning resources and references for teachers and students of similar universities.

3. Construction of Teaching Resources

Based on the Anhui Province Online Course Learning Center - "E-Learning" platform, collect a large number of teaching resources provided on the platform for "Python Language Programming" MOOC resources and modify them to build resources that meet teaching needs and push them to the platform.

By using the "Rain Classroom" smart tool, teaching materials such as lesson plans, courseware, instructional videos, exercises, and test paper libraries for resource-sharing courses can be quickly published on the platform, completing the construction of the school-based curriculum resource library.

Expand the teaching content and teaching space, and integrate the value shaping, knowledge imparting and ability cultivation through the close integration of professional knowledge education and ideological and political education. Through the Internet to collect stories, pictures, videos, literature and other resources of the course to establish a course ideological and political resource database, and take the cohesion and dissemination of social positive energy as an important content of ideological and political course theory teaching and practical education.

The blended teaching mode combines traditional classroom teaching and online learning, breaking the shackles and limitations of the conventional teaching mode. By building a rich course resource library, we can provide students with a more flexible, convenient and

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personalized learning experience. Teaching resources are designed for each knowledge point, and the course content is arranged as shown in Figure 1.

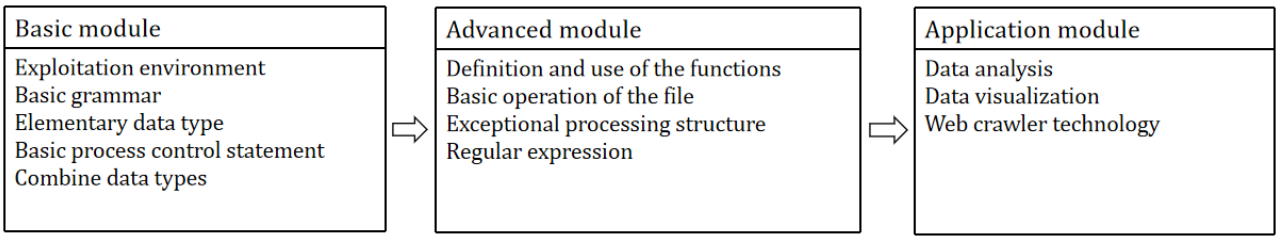

Figure 1: Content arrangement of Python programming course

4. Design and Implementation of Blended Teaching Mode

4.1. The Case Teaching Method Runs Through the Whole Teaching Process

The Python standard library provides additional features such as system management, network communication, text processing, database interfaces, graphics systems, XML processing, and more. The Python community offers a large number of third-party modules, which are used in a similar way to standard libraries. Their functions cover multiple fields, such as scientific computing, web development, database interfaces, and graphic systems. Python is often used as a "glue" language between other languages and tools [3, 4].

Because of the particularity of Python language, case teaching runs through the whole teaching process in the actual teaching process, and students can understand and learn to use the commonly used library in Python through interesting cases.

For example, by the "python drawing" , let students understand the use of turtle library; By the "day day up power", let students understand the use of math library and indirectly understand the importance of daily learning; By the "seven-paragraph digital pipe drawing", let students understand the use of datetime library; By the "statistics of the number of characters in classical literature", let students understand the use of jieba library; By the "Chinese University Rankings", let students understand the use of requests library and beautifulsoup4 library; By example analysis, students can understand the methods and steps of data analysis and visualization by using Python.

4.2. Diversification of Teaching Methods

Establish a course resource library through course resource sharing website platforms, MOOC teaching platforms, and the "Rain Classroom" smart teaching tool. Students can independently learn MOOC teaching videos, and access shared learning materials on their mobile phones or computers. Expand the time and space of teaching and implement diversified teaching methods.

In terms of teaching methods, blended teaching is not limited to a certain form, and the teaching process focuses on students as the main body, emphasizing the cultivation of teamwork and communication skills. The specific implementation process includes three stages: pre-class stage, in-class stage, and after-class stage. As shown in Figuer 2, each stage has its specific tasks and goals.

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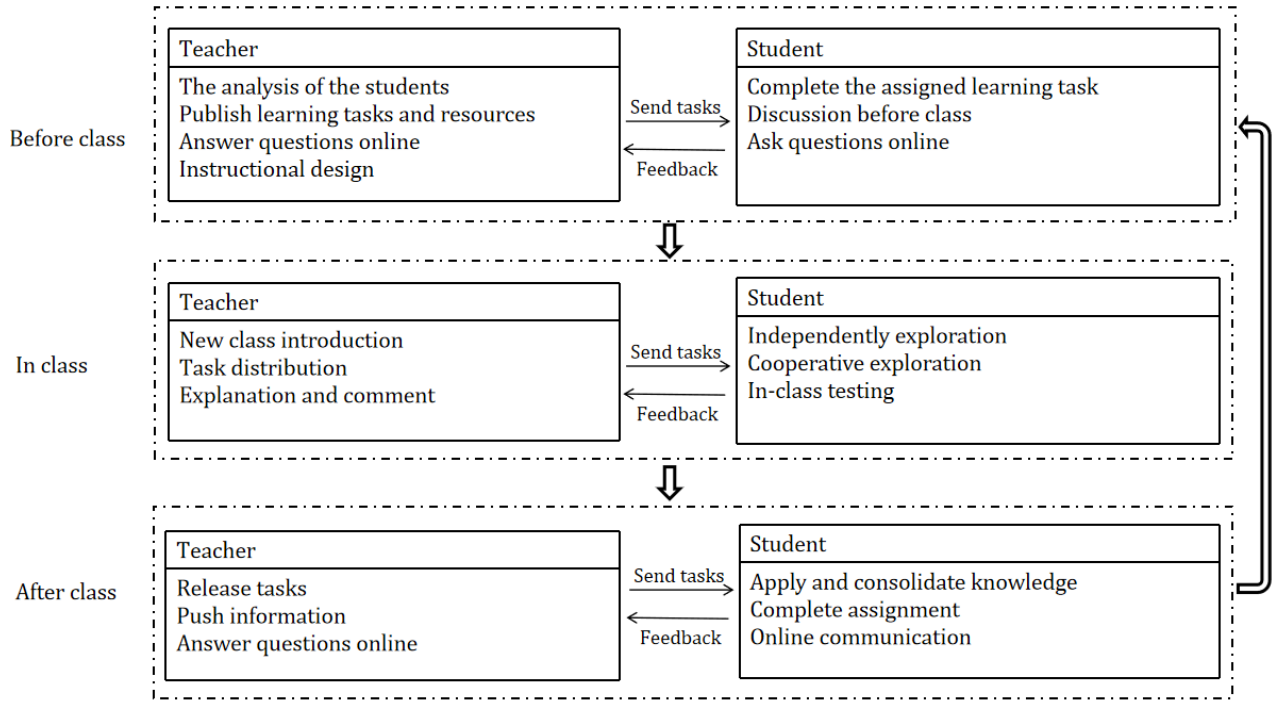

Figure 2: The framework of online and offline blended teaching mode

4.2.1. Pre-class stage

Release of learning tasks and resources: Teachers release learning tasks through "rain classroom" to guide students to learn independently and lay a foundation for subsequent classroom learning. At the same time, teachers will upload relevant teaching resources, such as teaching videos, courseware, reading materials, etc., for students to preview and reference.

Students' independent learning: Students use the resources on the "Rain Classroom" and "E-hui Learning" platforms to carry out independent learning and complete the tasks assigned by teachers. By watching videos, reading courseware, and participating in online discussions, students will have a preliminary understanding of the upcoming content. In the process of independent learning, students can submit their problems and suggestions to the learning platform to form feedback on independent learning [5].

Teacher guidance and feedback: Teachers can conduct synchronous or asynchronous communication and feedback with students through the discussion area, QQ and other network communication tools provided by the learning platform [6]. This kind of communication not only helps to answer students ' questions, but also makes teachers understand students' learning progress and confusion to carry out targeted personalized guidance.

4.2.2. In-class stage

Collaborative inquiry and face-to-face teaching: In the class stage, teachers and students conduct collaborative inquiry in the class. Teachers guide students to think deeply and carry out research learning activities through teaching, group discussion, questioning and other teaching methods. This face-to-face teaching method is conducive to solving the key and difficult points of learning and strengthening the emotional communication between teachers and students.

Mutual evaluation between students and teachers' comments: In classroom teaching, teachers can timely guide and correct students' learning results by organizing activities such as mutual evaluation and teacher comments. This evaluation method helps to cultivate students' critical thinking and self-reflection ability.

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4.2.3. After-class stage

Consolidation training and expansion learning: The after-class mainly focuses on the consolidation training of classroom teaching content. Teachers upload classroom teaching videos, texts, PPTs, and other learning resources through online teaching platforms to facilitate students' consolidation and reinforcement learning after class. At the same time, teachers can also release extended inquiry tasks and after-class exercises to test students' mastery of knowledge points and expand their learning horizons.

Evaluation of teaching effect: Teachers evaluate the teaching effect through students' homework completion, online test scores and classroom performance. This evaluation helps teachers to understand the learning effect of students and to adjust teaching strategies and methods.

In summary, the implementation process of blended teaching is gradual and interconnected. Through the organic combination of pre-class, in-class, and after-class stages, the advantages of blended teaching can be fully utilized to improve teaching effectiveness and learning quality.

5. Course Assessment Method

According to the characteristics of Python programming courses with fewer class hours and strong practicality, it is particularly necessary to design a comprehensive and more objective evaluation and assessment system in blended teaching [7]. The blended teaching design of "pre-class, in-class, and after-class" provides students with a variety of learning activities, all of which participate in the final grade assessment. In the course assessment method, strengthen process assessment to promote teaching, encourage students to actively participate in the classroom, and improve teaching quality and effectiveness.

Course assessment mainly includes regular assessment and final assessment, among which regular assessment consists of two aspects: on the one hand, using "Rain Classroom" and "E-learning" for the online evaluation, mastering students' basic theoretical learning dynamics through the completion of online assignments and tests, and evaluating students' offline learning mastery through classroom interaction, classroom tasks, and other situations; On the other hand, offline assessments are conducted by assigning practical experimental tasks to evaluate students' daily learning performance. The final evaluation adopts a computer-based approach, where students complete several programming questions within a specified time frame. The programming questions are based on real-life cases and mainly assess students' ability to use the knowledge they have learned to solve practical problems.

6. Teaching Effect

The Python programming course has gone through two semesters of teaching practice since exploring blended teaching models. Compared to before exploring blended learning, certain results have been achieved. The blindness of students' learning courses is reduced, and the curriculum construction is fully affirmed, which shows that blended teaching has a certain effect.

(1) In terms of resource construction, MOOCs and question banks incorporating ideological and political elements have been established. Students can use mobile phones or computers to learn and share learning materials, which expands the time and space of teaching.

(2) Utilizing the "e-Learning" teaching platform and the intelligent teaching tool "Rain Classroom" to achieve dual drive teaching, adopting a blended approach of online and offline, in-class and out-of-class teaching, etc., to grasp the dynamics of students' learning anytime and anywhere, pay attention to the personality development and growth needs of students with different foundations, and provide more accurate reference for teaching.

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(3) Guide students to participate in subject competitions and win awards; Participate in the College Student Innovation Training Program. Guide students to utilize their information technology skills and apply the knowledge learned in class to extracurricular practice.

7. Conclusion

Blended teaching combines the flexibility of online teaching with the interactivity of traditional teaching through the organic combination of "online" and "offline". In the blended learning of Python programming courses, the "Rain Classroom" intelligent teaching tool is used as a carrier, and high-quality online resources are fully utilized as teaching content supplements. Based on the effectiveness of teaching practice, optimize teaching content, assessment forms, etc., and actively promote the sustainable development of blended curriculum construction. Of course, in blended teaching, online learning and tests require students to complete independently, which may result in students not taking their studies seriously. In the future, with the continuous development of technology and the updating of educational concepts, blended teaching will be more widely applied and developed. Teachers need to constantly explore and improve the theoretical and practical system of blended teaching to better meet students' learning needs and educational goals.

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References

[1] Y. Ou, X.M. Tian, X.Z. Yu: Exploration of Python Programming Teaching Reform Practice under the Background of New Engineering, Computer Knowledge and Technology, Vol. 20(2024) No.08, p.156-158+180.

[2] D.Q. Sang: Research on the ideological and political reconstruction of the "Python programming" course in higher vocational education, Journal of Huainan Vocational & Technical College, Vol. 23(2023) No.03, p.52-55.

[3] X.Q. Pang: Decoy molecule generation algorithm based on physical and chemical properties and structural topological parameters and its application (MS., South China University of Technology, China 2017) , p.11.

[4] Z.L. Fang, F.J. Kuang: Data analysis of NetEase folk song lyrics based on Python, Computer & Telecommunication, Vol. 24(2018) No.04, p.53-56.

[5] Y.P. Li, Y. Chen: Exploration of blended online and offline teaching in primary school physical education teaching, Modern Teaching, Vol. 37(2021) No.Z1, p.124-125.

[6] H. Guo, X.H. Zhang, X.P. Wang, et al.: Evaluation of the Effectiveness of Blended Teaching Reform in Medical Research Methodology for Clinical Medicine Majors, Journal of Nongken Medicine, Vol. 42(2020) No.04, p.363-366.

[7] H.Y. Xu, P. Liu,W.L. Huang: Exploration and Practice of Mixed Teaching Mode in Python Programming Course, Computer Knowledge and Technology, Vol. 20(2024) No.07, p162-164.