

# Exploring the Teaching Mode of Non-computing Major Python Course Under Digital Empowerment

Minmin Li\*, Yanyu Diao

School of Big Data and Artificial Intelligence, Anhui Xinhua University, Hefei 230088, China

\* Corresponding author: 464130929@qq.com

## Abstract

Under the background of the digital era, taking the teaching of "python" as an elective course for accounting majors as an example, we introduce the blended teaching mode, follow the teaching principle of teacher-led and student-subjective, adopt the rain classroom teaching platform, and implement the "online + offline" blended teaching mode; meet the students' independent learning and the multidimensional teaching needs of the course to keep up with the times. The combined teaching mode can satisfy the multidimensional teaching needs of students' independent learning and the course's up-to-date development and provide a useful reference for the reform of the blended teaching mode of non-computer majors' Python courses.

## Keywords

Digitalization of Education, Rain Classroom Platform, Python Language Programming, Blended Teaching Model.

## 1. Introduction

With the rapid development of the technological revolution, digital technology has become an important means to promote the modernization of Chinese-style education<sup>[1]</sup>, which supports the fairness of higher education and improves the efficiency of higher education. In recent years, with the use of various catechisms and micro-classrooms in colleges and universities, digital empowerment of college classrooms has become a major hotspot of concern in higher education. To achieve the goal of fairness in higher education provides an important guarantee. In the construction of education power, the leader is that education takes the lead in completing the higher education power, it is the era that gives us the historical responsibility and is a new time to explore<sup>[2]</sup>. Higher education is fundamentally in teaching in the classroom; therefore, in the above context, Anhui Xinhua College, as a local, open and application-oriented private college, should actively embrace and conform to the continuous innovation and development of information technology. In the second semester of the academic year of 2023-2024, Anhui Xinhua College opens a Python language programming course for first-year students in 28 non-computer majors classes for local and national cultivation of broad knowledge, compound and innovative application talents. In this paper, we take the accounting major as an example to explore the teaching mode of a Python classroom under the background of digitalization.

### 1.1. The current situation of teaching python courses for non-computer majors

In 2018, the Ministry of Education listed "python language programming" as a subject in the computer level 2 examination, which can be seen in many programming languages; Python has become a more popular programming language. Up to now, more and more colleges and universities have opened Python programming courses for all first-year students to improve their thinking and programming abilities. However, the course also needs help with the following difficulties.

### **1.1.1. The course content is not distinctive, and the important and difficult points are not prominent**

The traditional teaching of the course is often purposeful and planned by the teacher to teach students systematic cultural knowledge and emphasize the teacher's main position in the classroom, ignoring the combination of imparting knowledge and cultivating students' abilities at the same time. The classroom focuses on cultivating students' basic academic ability, mastery, and understanding of textbook knowledge but neglects to focus on expanding students' knowledge and ability and nurturing students' inquiry ability. When encountering actual engineering problems, the ability of students to write code needs to be improved, or there is no way to start.

### **1.1.2. Single teaching method and incomplete assessment method**

Teaching should follow the principle of combining teacher-led and student subjectivity, and the traditional classroom model is still the teacher as the main body. The students carry out a grand slam, so classroom teaching tends to be boring, the student's classroom participation is low, there is a serious classroom to play with cell phones, sleep and other phenomena, resulting in low teaching efficiency. Secondly, the traditional teaching evaluation method is often the final written examination assessment plus the assessment method of online classes. The written examination is often more focused on the examination of the student's theoretical knowledge mastery proficiency, ignoring the students' practical hands-on ability; the online examination form, although to a certain extent to make up for the shortcomings of the written examination, but to a large extent, the assessment is still the students' textbook knowledge of the programming ability to the actual ability to solve engineering problems is difficult to assess.

### **1.1.3. The lack of basic programming thinking and the cultivation of students' independent learning ability**

For non-computer majors, most students do not have the basic idea of computer programming and have just started to contact the computer program control structure, syntax, functions, data types and other concepts are difficult to understand<sup>[3]</sup>, so the teaching of programming language is facing a more serious challenge. Secondly, the traditional classroom model is based on injection; teachers are prone to subjective students as mere containers of knowledge to instill knowledge in students; this classroom model is not conducive to the cultivation of students' computational thinking and students' ability to learn on their own, and it is not easy to realize the goal of cultivating innovative and complex talents with broad knowledge, strong ability and high quality for the country. Most of the students who come into the learning mode are still mainly dependent on the classroom and the teacher; independent learning consciousness is not strong, and there is a lack of independent thinking ability and independent learning ability.

## **2. Digital Empowerment Under the Python Language Program Design Course Blended Teaching Design**

With the rapid development of the technological revolution, digitalization has become an important means to boost the modernization of Chinese-style education<sup>[4]</sup>. The development of Chinese education is shifting from quantitative expansion to a critical period of quality improvement, and the deep integration of digital technology is the key to realizing this shift. By utilizing the powerful functions of digital technology, we can build a more open and personalized education system, which can not only promote the fundamental transformation of teachers and students in their ways of thinking, teaching attitudes, behavioral habits, and psychological states but also help them gradually transition from the traditional teaching mode to a modern teaching framework. This transformation will further stimulate the individual

potential of students, prompting them to grow into modern newcomers with unique personalities and all-around development, laying a solid foundation for adapting to and leading the future society. Rain Classroom adopts cutting-edge teaching concepts and Internet technologies. With the help of cell phones, PowerPoint and WeChat, it realizes the organic closed loop of "before class - during class - after class" realizes the intelligence of the teaching process and the visualization of the data, and brings a brand-new classroom experience to the students<sup>[5]</sup>.

### **2.1. Integration of rain classroom teaching mode**

According to the characteristics of non-computer students' learning situation and the characteristics of the "python language programming" course, using the rain classroom teaching platform to form a new teaching hybrid teaching mode, the whole teaching process can be divided into three sections "before class - during class - after class" The specific teaching mode is shown in Fig 1.

Pre-course pre-study plays a crucial role in the effectiveness of teachers' classroom teaching and students' ability to grasp knowledge. In modern educational practice, the implementation of pre-course pre-study faces numerous challenges. Students' need for self-management skills and teachers' difficulties in monitoring and evaluating the effectiveness of students' pre-study often lead to inadequate pre-study activities, which in turn affects the synergy of teaching and learning in the classroom. To solve this problem, digital platforms such as Rain Classroom provide online pre-study and monitoring functions to help teachers effectively track and manage students' pre-study progress, ensuring that classroom learning can proceed smoothly.

Rain Classroom releases pre-course pre-testing tasks, upholds the student-centered teaching strategy, and pushes the latest pictures of scientific achievements and news related to the course to students through the Rain Classroom platform to ensure the advanced scientific nature of the teaching; at the same time, students are grouped, and practical application cases are released in Rain Classroom so that a number of students with different abilities form a group. Together, they can help each other complete the teaching tasks.

During the class, teachers first use the rain classroom platform to let students enter the classroom by scanning the code so that teachers can not only see the attendance rate of students but also utilize the rain classroom exercise release function to test students' mastery of classroom knowledge.

After class, by releasing exercises to students, teachers can set the end time of the exercise test, analyze the exercises done by students, view the higher error rate of students' exercises so as to reflect on their classroom teaching and adjust the content system of rain classroom teaching in a timely manner according to the whole process of teaching data provided by the rain classroom platform<sup>[6]</sup>.

### **2.2. Diversified forms of assessment**

In the hybrid teaching mode after integrating the rain classroom platform, the form of assessment should also be adjusted in a timely manner in conjunction with the teaching mode, and the performance of students in the rain classroom should be included in the assessment mode so as to carry out an all-round examination of students.

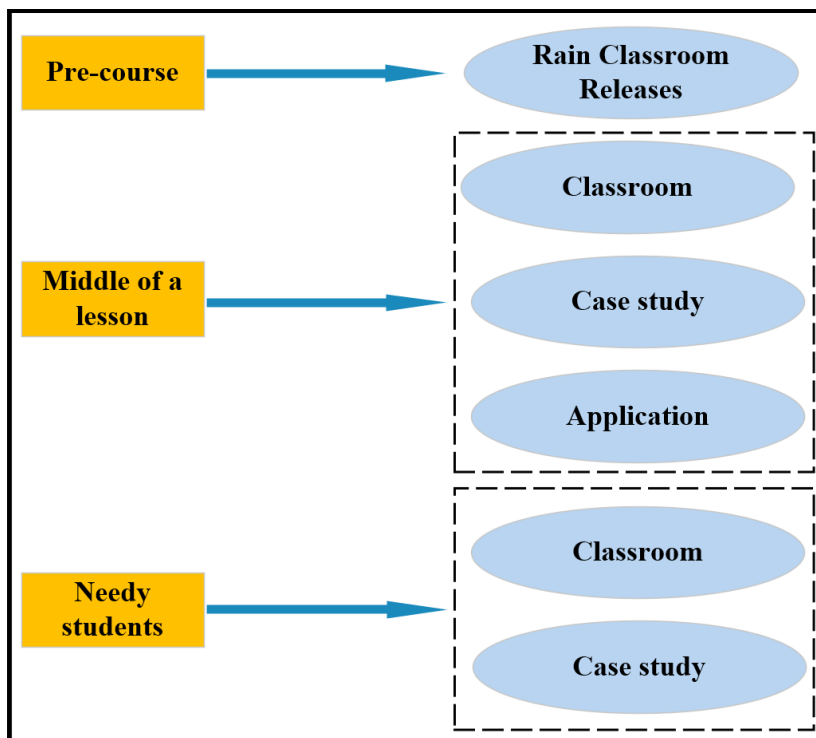


Figure 1. Instructional model of the integrated rain classroom

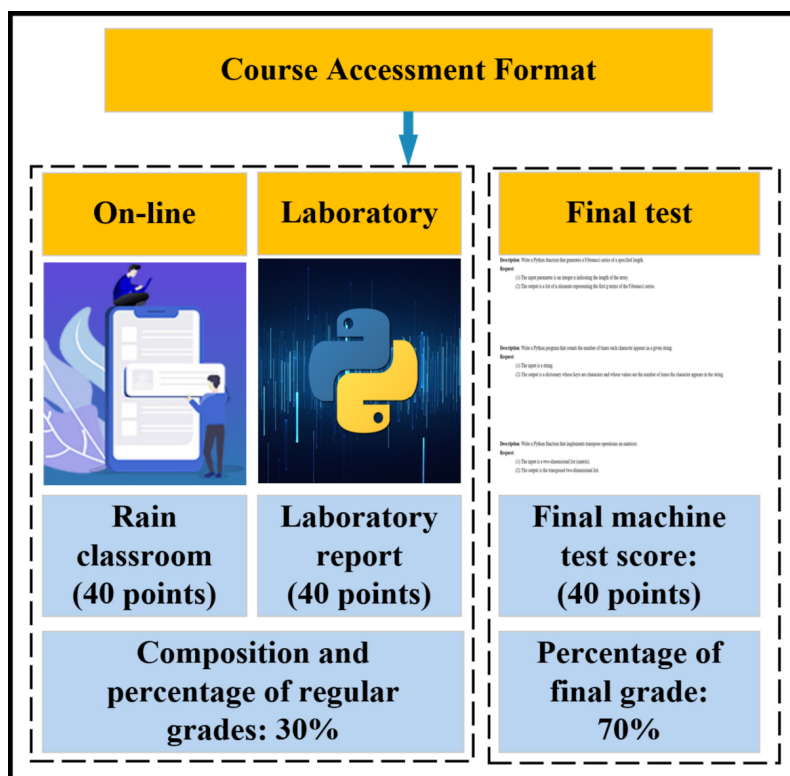


Figure 2. Composition of course assessment methods

As shown in Figure 2, students' grades are mainly composed of usual grades + final grades; of which usual grades and by the rain classroom 40 points + 60 points of the experimental report, its experimental projects 3, usual grades accounted for a total of 30%; to the certificate in lieu of the test score of 100 points, accounting for 70%.

### 3. The New Teaching Effect Evaluation

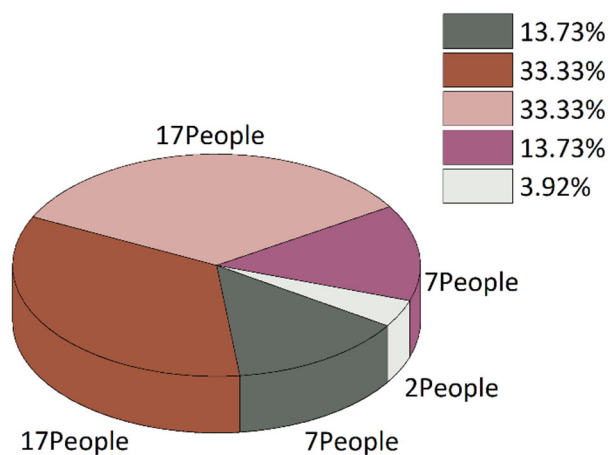
Compared with the traditional classroom, the teaching mode that incorporates the rain classroom learning platform enriches the diversity of teaching forms. While improving students' knowledge mastery, the innovation of teaching mode can also increase students' interest in learning in the classroom. For the traditional classroom teachers to assign after-school homework, due to the large number of students, the teacher has little time, resulting in untimely checking of students' after-school homework; homework checking is inefficient, so some students have always been on the after-school homework to take a chance. Rain classroom teaching platforms can better solve these problems; teachers can be arranged according to the content of learning and course hours in the rain classroom assignments, students can be directly online to check the completion of student assignments, and students play a supervisory role. In the teaching process, teachers can obtain students' comprehensive learning data by means of random naming, pop-ups, submissions of online quizzes, etc., so as to quickly grasp the overall learning status of students and adjust the teaching progress, which solves the problem of separating "teaching" and "learning". An active classroom atmosphere enhances students' learning participation and enthusiasm and realizes teacher-student interaction<sup>[7]</sup>.

Taking the non-computer accounting majors as an example, the 51 student assignments in the class can be exported to see the student name, student number, exam time, completion time, completion status and other information. As shown in Table 1 Three Scheme comparing, the rain classroom homework export part of the information is displayed.

**Table 1.** Student Assignment Information

Affiliated Colleges: School of Accounting and Finance			Affiliated administrative classes: 23 Accounting Class 1		
Student number	Score	Student number	Score	Student number	Score
1	45	18	44	35	45
2	50	19	45	36	28
3	50	20	43	37	37
4	50	21	32	38	24
5	50	22	50	39	45
6	50	23	40	40	50
7	40	24	50	41	26
8	50	25	50	42	30
9	50	26	18	43	45
10	45	27	50	44	45
11	45	28	50	45	50
12	50	29	35	46	16
13	45	30	20	47	40
14	40	31	45	48	50
15	45	32	50	49	45
16	45	33	42	50	40
17	45	34	45		

Secondly, we can analyze the student's completion of the topic, in which the final assignment, for example, the total score has a total of 50 points, according to the grading system, divided into excellent (45-50 points), good (40-45 points), medium (35-40 points), passing (30-35 points), failing (0-30 points). As shown in Figure 3, the whole pie chart shows that students accounted for more excellent as well as good, with the passing rate reaching about 86%; most of the students have a good grasp of classroom knowledge.



**Figure.3.** Completion of homework after rain class

#### 4. Conclusion

In the context of education in the new era, higher education should take digital transformation as a hand and strengthen digital empowerment. The new hybrid teaching mode integrated into the rain classroom is a necessary reform of the teaching form made by combining the learning characteristics of students in higher education and the characteristics of the classroom. The rational use of teaching means expands the teaching space and adds new learning experiences for students compared with previous traditional teaching. At the same time, the use of digital technology means the students use classroom platform data to analyze the teaching process and leave traces. But the new teaching mode will also produce certain disadvantages, such as the classroom increases the time students playing cell phones, teachers can not guarantee that each student is really using the cell phone to learn when the teacher opens the rain classroom pop-ups to mobilize the enthusiasm of the students, but there will also be some ineffective pop-ups to affect the order of the classroom. Therefore, how to better digital technology should be taught, but it also needs to be further explored.

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#### References

- [1] SONG Shuguang, JIANG Fugao, LI Chengwei. The core meaning and practical strategy of digitalization to promote the modernization of Chinese-style education[J]. Teaching and Management, 2024, (21): 27-31.
- [2] China Society of Higher Education 2024 Working Conference Held in Beijing[J]. China Higher Education Research, 2024, (04): 111-112.

- [3] GUAN Chengbin, LI Lian, WANG Jie, et al. Exploration and practice of “crash” teaching of second programming language for non-computer majors[J]. Computer Engineering and Science, 2019, 41(S1): 186-189.
- [4] SONG Shuguang, JIANG Fugao, LI Chengwei. The core essence and practical strategy of digitalization to boost the modernization of Chinese-style education[J]. Teaching and Management, 2024, (21): 27-31.
- [5] LING Mengfu, HU Yun, ZHANG Ling, et al. The new teaching mode of “rain classroom combined with BOPPPS model” in biochemistry experiment[J]. Laboratory Research and Exploration, 2024, 43(07): 206-210.
- [6] ZHANG Hongmei, TUO Mingfu, ZHAO Yongmei, et al. Exploration on the application of blended teaching in university computer foundation teaching[J]. Computer Engineering and Science, 2019, 41(S1): 170-173.
- [7] MA Yingjie, YANG Yatao, XIAO Song, et al. Research and practice of intelligent teaching mode of “five-in-one” communication principle course[J/OL]. Computer Science, 1-8[2024-08-13].