An Empirical Study on the Reform of Teaching Mode in Western Universities
--Taking the online and offline blended teaching reform of "Computer Foundation" in Xinjiang University as an example

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Abstract. The course "computer foundation" bears the responsibility of cultivating the future national information literacy. Facing the fact that the overall computer ability of freshmen in western universities is low and the teaching effect is not optimistic, the teaching reform is urgent. This paper takes the online and offline blended teaching reform of "computer foundation" in Xinjiang University as an example. Through the exploration and practice of the mixed teaching mode of "multivariate -six order", the overall performance of students shows an upward trend, and students have a high degree of recognition and acceptance of the blended teaching. Facts have proved that blended online and offline teaching is effective in the practice of this course.

1. Introduction
In 2005, the Report of the President's Advisory Council on Information Technology-"Computing Science: Securing American Competitiveness" stated: "While computers are a discipline in their own right, they serve to promote the development of other disciplines. "The most important and economically promising research frontiers of the 21st century have the potential to be solved by mastering advanced computing techniques and applying computing science." [1] "Computer foundation" is to cultivate the information literacy of all college students. All college students learn the basic principles and application methods of computer through these courses, so these courses determine the information literacy of the whole nation in the future. [2]

2. The teaching dilemma of "Computer Foundation" course in western universities
Xinjiang University is a double first-class construction university. Due to the objective reasons of the student source structure, the computer ability of the freshmen is generally low, with more than half of the students having zero computer foundation, especially the students from ethnic minorities in remote areas. In September 2018, more than 200 students were tested in order to understand the basic computer application ability of freshmen at the university. These students were among the more than 4000 freshmen in the whole school who had registered for certain information technology course learning foundation. The result is that only 23 students have achieved 75 points or above (See Figure 1). It is a great challenge for the teaching reform of basic computer course to realize the teaching goal of zero-basis computer students.
In order to understand the level of basic computer teaching in schools more objectively, we take the pass rate of National Computer Rank Examination as the standard, and compare the pass rate of National Computer Rank Examination with that of schools. According to online statistics\([3]\) in 2017 and 2018, the average passing rate of the national first-level examination exceeded 50%, and the average passing rate of the second-level examination basically ranged from 40% to 60% (See Figure 2). However, the first-grade pass rate of our school does not exceed 35%, and the second-grade pass rate does not exceed 20% (See Figure 3). According to the survey, other universities in Xinjiang are not optimistic. Computer basic teaching reform is imminent.

3. Opportunities brought by blended online and offline teaching

Faced with such difficulties, the rapid rise of MOOC seems to offer some hope. MOOC, namely massive open online course. It is reported that 12,500 MOOC courses have been launched in China with more than 200 million students, ranking first in terms of the number of MOOC courses and the scale of their application in the world.\([4]\) However, the use of MOOC alone is clearly not suitable for school education and cannot completely replace traditional classroom teaching. In 2013, Sophia, a 10th grade student from Washington International School, decided to return to school after a year of successful distance online learning to continue learning in grade 11. She realized that the teaching advantages provided by face-to-face classroom can not completely replace, but at the same time, she will consider the online virtual classroom is as important as the actual classroom.\([5]\) In 2015, the success of the implementation plan of "University Computer" and "MOOC+SPOCs+ Flipped Classroom" hosted by Professor Zhan Dechen seemed to open a window for our teaching reform.\([6]\) So far, we have preliminarily determined the online and offline blended teaching mode to carry out teaching. The advantages of blended online and offline teaching are obvious:

First, students born after 1995 and 2000, including young teachers, have not only changed the way they communicate with others, but also changed the way they acquire information and knowledge. The cognitive rules of students are mainly characterized by constructivism. They have been used to obtaining
information from multiple different channels. Instead of objecting to fragmented information, they feel close to it. Students' expectations of learning and courses show a trend of diversification.[7] Students are full of interest in bullet screen comments and prefer to use Internet language. It seems that their state will be more real behind the screen. If properly guided, these can be fully utilized by online teaching.

Second, for a long time, there is a general shortage of teachers for computer public courses. Take Xinjiang University as an example, several teachers of the public computer course are responsible for the teaching of more than 3,000 students in the university every year. They are tired of attending classes and unable to innovate. If high-quality online learning resources can partially relieve them from the heavy teaching tasks, these teachers will have time and energy to carry out teaching reform, and then their teaching level and effectiveness will be improved, so online teaching is imperative. So far, we have preliminarily determined the online and offline blended teaching mode to carry out teaching.

The third is to summarize the main problems in our existing teaching: first, there is a big gap between the single teaching goal and the diverse expectations of students. The teaching content does not adapt to the development of information technology, and the classroom teaching is unified and uniform, which makes it impossible to teach students according to their aptitude and to teach students differently. Second, in the teaching process, lack of effective interaction and communication between teachers and students, and the in-depth integration of information technology and teaching; Third, the evaluation method is single, the teaching monitoring ability of teachers is insufficient, especially the awareness and ability of learning monitoring; Lack of feedback mechanism and formative evaluation. Above questions, we also see the vitality of online and offline blended teaching.

Online and offline blended teaching enables students to study independently, and the learning rhythm and content can be controlled by themselves. Cooperate with practice, test, discussion, stimulate students' learning enthusiasm, enhance their self-learning ability; In offline teaching, teachers take the lead to further explain the important and difficult problems in teaching, or use flipped classroom to complete the systematic teaching. In addition, blended teaching achieves process management by adopting students' online learning habits, watching videos and chapter tests, at the same time, carry out summative evaluation through offline examination, which makes the evaluation more objective and scientific. Finally, through the combination of online and offline to improve the quality of teaching.

Through the above analysis, we are convinced that the blended online and offline teaching model will bring improvement to the existing teaching.

4. Remolding the teaching objectives

Professor Wu Lichun pointed out that university computer science courses should be viewed from the perspectives of the requirements of information literacy for future citizens, the sustainable competitiveness of students as they move into the society, and the resulting national development strength.[2] Action plan for education informatization 2.0 points, to 2022 basic generally improve the application level of informatization and the teachers and students information literacy, improving from information technology application ability to improve information literacy, the shift from fusion applied to the innovation and development, efforts to build "Internet +" under the condition of new pattern of talents cultivation, development of new services based on "Internet + education" mode, explore the new information age education governance mode.

Accordingly, under the guidance of Bloom's theory, we focus on the positioning and role of information literacy in talent cultivation, integrate the needs of various majors into the course learning, and achieve the teaching goal of all-round education. The course is divided into three stages to gradually realize the three goals of knowledge, ability and quality:

(1) Knowledge objective: To master basic knowledge of information technology and computer application ability, and lay a foundation for subsequent learning of information courses and related professional courses;

(2) Ability objective: To cultivate the ability to use information technology for in-depth learning and problem solving, as well as the ability to learn and do things in communication, practice and innovation;
(3) Good information literacy: To cultivate students' basic information literacy, the pursuit of excellence and the spirit of hard work and pragmatism, and make information literacy a new engine for efficiency improvement and lifelong learning.

5. Construction of online and offline teaching resources
In view of the low computer level and ability of freshmen, we decided to make our own online teaching resources. In the first stage, we made 58 MOOC videos, 535 minutes, 1372 exercises and test questions, and put them online on the Super Star platform. In the second stage, we made our own experimental question bank, including 630 experimental questions, to prepare for offline experimental teaching.

In the design of teaching content, our thinking is to focus on the foundation, hierarchical design. For many zero-based students, we still rely on basic computer knowledge and skills to internalize the understanding of computational thinking into the teaching content. For students with strong learning ability, there is an advanced part in the teaching content for their self-study; In addition, the teaching content is integrated into the course ideology and politics, through the introduction of domestic hardware and software, network and information security related knowledge, to achieve all-round education.

6. Exploration and practice of the blended teaching mode of "multivariate - six order"
According to the survey, most teachers regard online learning as the "prelude" and "continuation" of classroom teaching, requiring students to complete online preview, review, knowledge expansion and other related tasks, while the traditional classroom teaching model of teachers and students has not changed substantially because of online learning. Our instructional design, according to the characteristics and teaching goal, highlight the cultivation of the students' practical and innovative ability, we in the teaching design, first on the online teaching emphasis clearly divided: online focuses on theoretical teaching, mainly completed by students self-study, auxiliary to guide teachers to learn and coaching answering questions, namely, online teaching is not only supplement offline teaching, but as a relatively independent part of teaching; Offline teaching focuses on experimental teaching, focuses on cultivating students' practical ability, and assists teachers to explain the important and difficult points of teaching content and help them answer questions. At the same time, in order to ensure the effectiveness of the reform, we strengthen the whole process management of students' learning through online chapter test and offline pass test.

After more than two years of teaching reform and practice, the blended teaching mode of "multivariate - six order" has been explored to form the stereoscopic teaching practice combining information technology with professional needs and integrating curriculum ideology and politics.

(1) "Diversity" of teaching design:
- Teaching content: in line with the academic situation; High quality cases and teaching resources support; All-round education
- Teaching methods: Immersive learning such as pass test, group discussion, etc.
- Teaching means: examination platform, electronic information file, etc.
- Teaching evaluation: the combination of formative evaluation and summative evaluation

(2) The "six order" of teaching design -- "Learning, supervising, consulting, lecturing, testing and evaluation":
- Students learn online, practice and chapter quizzes;
- Teachers should inform and supervise students before class;
- Students ask questions that they don't understand and discuss in groups.
- Teachers make a important, difficult and doubtful explanation;
- Students are given pass tests;
- Teachers analyze and comment on the test results and explain the problems in the test.
7. The effect and evaluation of teaching reform

The results of the questionnaire (845 valid questionnaires) show that students who like or prefer blended teaching account for 84.3%. 77.2% of the students think that online learning resources are very rich and relatively rich; 71.1% of the students think that the pass test is of great help to their study.

Facts have proved that blended online and offline teaching is effective in the practice of this course, which is mainly reflected in:

Through the analysis of learning data, master students' learning status in time, and send different learning tasks to students at different levels to realize differential teaching;

The teaching methods, such as case teaching and pass test, enhance students' interest in learning. During the learning process, students should grasp the learning rhythm by themselves, and use the online platform to communicate with teachers and students at any time, so as to give full play to the main role of students.

![Figure 4. Course performance comparison between 2018 and 2019](image)

The overall performance of students shows an upward trend (See Figure 4). Computers have become a powerful tool for students to acquire knowledge and improve their quality, and the training objectives are basically achieved.

However, there are still some outstanding problems in the implementation of blended teaching:

1. As the leader of blended teaching, teachers play a crucial role in the whole online teaching activities. Teachers need to review online resources, timely release them, actively guide and supervise students, and answer questions in the discussion area. Since online teaching is generally not included in teachers' actual teaching hours, it may cause insufficient motivation for teachers to carry out blended teaching.

2. As the main body of blended teaching, a small number of students may lack self-control and fail to invest effectively in online learning. How to improve the efficiency of online learning? In addition, when students encounter problems in online learning, whether they can get help in time will also affect their interest in learning; In the survey, 31.7% of the students admitted that the biggest difficulty in online learning is the lack of autonomy. 33.6% of students think online learning is inefficient.

8. Optimization strategy

On November 3, 2018, Wu Yan, director of the Higher Education Department of the Ministry of Education, proposed to create "innovative and challenging golden courses" on the topic of "first-class majors and courses". The Ministry of Education will build 20,000 "golden courses" in the next four to five years. At present, the teaching reform has achieved phased results. It has become one of the first blended teaching demonstration courses in the university, and has been selected as the blended online and offline first-class courses in Xinjiang Uygur Autonomous Region, and is participating in the selection of national first-class courses.

In order to cultivate students' good information literacy, help achieve the goal of cultivating outstanding undergraduate talents, and educate students comprehensively, this course will be continuously constructed and optimized in the later stage:

1. Timely update and improve the teaching content and teaching resources. Due to the rapid development of information technology, the course content should actively adapt to the development of new technology, new industry and new economy, and timely supplement and improve the teaching content and teaching resources.
(2) Optimize the teaching mode. In view of the weak computer foundation of students in our university and Xinjiang region, we will continue to explore the blended teaching mode that is in line with students' reality, introduce high-quality information-based teaching means, carry out continuous research and reform on teaching design and evaluation system, and strive to achieve the best teaching effect.

(3) Improve the evaluation system. It is necessary to formulate a scientific, reasonable and operable assessment method to ensure that all the factors of process assessment are refined. Based on the characteristics of teaching mode, we should pay more attention to the assessment of practical ability and adopt diversified assessment methods to stimulate students' independent learning ability.[10]

(4) Actively open the course to other universities and the society in Xinjiang, and jointly help the cultivation of information technology talents in the western region, so as to benefit more people.

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