Research on the QPITE Teaching Model Based on Core Literacy 4C in Private Universities

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Abstract. Since the new century, with the higher education from elite education to mass education and the appearing of new educational technology, private colleges and universities also urgently need to change the traditional teaching mode to adapt to the constant development and change. This paper puts forward the QPITE teaching mode according to the actual situation of private colleges and universities. This mode aims at the 4C of the talent cultivation standard in the 21ST CENTURY. It uses the Internet + to establish effective communication between teachers and students and make adaptive adjustment, so as to set up effective teaching plans. The teaching model according to the actual situation in the adaptive adjustment of teaching contents and teaching methods, improve the students' interest in learning, enhance the students' practical and innovative ability, cultivate and improve the students' humanistic quality goals. This teaching model has been well received in the practice of the curriculum.

1. The Causes of the Reform of Teaching Mode in Private Colleges and Universities

Since the new century, private institutions of higher learning have been developing and expanding with the encouragement and support of the state, and the number of college students has been increasing rapidly [1]. Private institutions of higher learning fill some professional gaps in public institutions of higher learning, but also provide more opportunities for students who fail in the exam or have professional hobbies. However, while private colleges and universities are flourishing, they are also facing more and more challenges in teaching.

For example, the traditional teaching mode of "Data Structure and Algorithm": the teacher teaches knowledge by the book, the students learn passively, and then the teacher assigns homework on the computer to guide the students to practice. In the Internet era, students have more diversified access to knowledge, and these learning resources are more novel and attractive than many knowledge in textbooks. The common response of students to the traditional classroom teaching, for example "Data Structure and Algorithm", is difficult and boring. Many institutions of higher learning in China have carried out a series of reforms and discussions in the teaching of "Data Structure and Algorithm", such as flipped classroom and other teaching methods [2], which have achieved good results.

However, compared with the general public institutions of higher learning, private institutions of higher learning encounter different difficulties in teaching. Teachers in private institutions of higher
learning are usually relatively weak. Many of them are retired teachers from public institutions of higher learning or young teachers just starting work [3]. These teachers are weak in the ability to accept and spread new knowledge or lack experience, and cannot attract students to participate in effective learning. At the same time, the level of private colleges and universities students varies. Some students accept quickly, but there are also some students with weak foundation. Due to the characteristics of students and teachers in private institutions of higher learning, students with good foundation are not full of learning, unable to further in-depth study, and students with poor academic performance cannot keep up with the progress of teachers, so they are not interested in learning.

Non-governmental institutions of higher learning in the past teaching adopted closely to the road of public ordinary institutions of higher learning, without considering the actual situation of non-governmental institutions of higher learning. The rigid teaching plans, class can only do some fine-tuning, caused the non-governmental institutions of higher learning in teaching and students' learning disjointed.

Private colleges and universities also adopted a series of measures. The method adopted by most private college or university is to reduce the difficulty of the basic courses and core courses. So most of the graduate students of private college or university in China couldn't compete with the students from general public institutions. Thus in a disadvantaged position in the recruitment new students, the quality of students source is worrying. This creates a vicious circle. It shows that private institutions of higher learning must make great efforts to improve their teaching quality.

2. Core Literacy 4C Model and Curriculum Integration in the 21st Century

How to solve the problems encountered in the development of private higher education and break such a vicious circle? The Framework for 21st Century Learning released by P21 provides us with enlightenment and reference. P21 is a global non-profit organization founded in 2002, dedicated to promoting all learners to acquire "core skills for the 21st Century" or "core literacy for the 21st Century".[4] These qualities are basically divided into three categories: learning and innovation literacy, digital literacy, and vocational and life skills literacy. Among them, the 4C model of learning and innovation skills/literacy, namely Critical Thinking, Creativity, Communication, and Collaboration, reflects the development trend of talent standards in the 21st century.

The overall planning of cultivating students' 21st century literacy through curriculum reform does not mean that a new curriculum should be designed for these qualities, but the corresponding and correlation between these qualities and existing courses should be clarified [5]. Through the reform of curriculum teaching mode, we strive to integrate 4C core literacy elements into the curriculum, change teachers' teaching and students' learning, and at the same time use new teaching technology to form a new teaching mode. It can cultivate students with the core quality of the 4C standard and become the talents needed in the new era.

The proposal of literacy in the 21st century and the corresponding curriculum reform jointly lead the teaching trend to be student-centered, promote students' independent learning, and design and carry out problem-based or project-based learning [5].

According to the characteristics of students in private institutions of higher learning and the talent standards in the 21st century, we have designed such a teaching mode as shown in Figure 1. This teaching method is different from the traditional teaching method. The early understanding of the
students' personal situation, help to stimulate the learning interest of different students. In the process of learning, students learn with questions and make clear their learning objectives and key points. Students' interest in learning will be enhanced, and their learning efficiency will be relatively high, which cultivates their thinking ability and judgment ability. It gives students the opportunity to practice the project and cultivates their ability to practice and create new abilities in the process of practice. At the same time, students need to cooperate with other students in the project, which cultivates their ability to communicate and cooperate. At the end of the course, students are guided to self-evaluate and encouraged to have the ability and willingness to critically and objectively evaluate their own learning. Through self-evaluation, it stimulates the fun of students' independent learning, and realizes that learning is a means of self-improvement. In the process of self-evaluation, it cultivates students' judgment ability and stimulates students' demand for continuous learning.

Figure 1. Student-centered teaching mode under core Literacy.

3. QPITE Adaptive Adjustment Teaching Model Based on Core Literacy

According to the teaching mode of cultivating the core literacy of the 4C standard, the author, through the study of higher education theory and the psychological characteristics of modern college students, and the use of favorable teaching tools and teaching means in the Internet era, studies a new teaching mode for private colleges and universities -QPITE. This teaching model involves the whole teaching process, adopts new Internet education technology, attracts students' interest, improves students' understanding, enhances students' practical ability, innovation ability and judgment ability, and cultivates modern college students' ability of cooperation and social communication. The teaching mode is introduced as follows:

Figure 2. Flow introduction of QPITE teaching mode.
Q: Question. After students select the course, the system or the teacher will send an electronic questionnaire to the students. The design of the questionnaire can enable the teacher to understand the learning level and personality characteristics of the students. Then the teacher can design and adjust the teaching plan.

Teachers can apply for the teaching time of the course according to the actual situation, such as changing from one semester to one and a half. They can also divide students into different classes according to their learning level. At the same time, students should choose reference books according to the teacher's requirements, and make good preparation and preview before starting the course.

IT: Interpret and Test. The classroom teaching of this course is conducted entirely in the computer room. The teacher is responsible for the explanation of knowledge. Due to the particularity of the course, the animation is used to demonstrate the derivation and deduction of key knowledge, so that students can have a deep understanding. Moocs can also be adopted, with teachers assisting in explanation. After each important knowledge point, the teacher will conduct a Test, which will be sent by the teacher. Teacher will decide the next study plan, and make real-time adjustment of the plan. E: Experiment. This is the key-point of the teaching model. There are small experiments and big experiments. Teachers play a role in answering questions and giving guidance. Students are responsible for the whole process. Students work in groups based on individual judgments. Groups of three to five people. Choose their own group leader and team members. In the experiment, the teacher answers the difficult questions.

The final evaluation of the course is divided into two parts: the computer test score and the experiment score. Computer test scores accounted for 40%, experimental scores accounted for 60%.

Each step of QPITE mode has self-adaptive adjustment and closed-loop operation, achieving the optimal effect, which can play a role in improving the teaching quality and cultivating students' independent learning ability and innovation ability. In each step, students are the main part.

Each step of this teaching model takes into account the integration of the core literacy 4C, and changes to student-centered teaching, aiming at stimulating students' initiative and enthusiasm in learning, guiding students' thinking and analysis, and cultivating students' 4C ability. The main correspondence of each is shown in the following table. The fused items are represented by "√".

<table>
<thead>
<tr>
<th></th>
<th>Critical Thinking</th>
<th>Creativity</th>
<th>Communication</th>
<th>Collaboration</th>
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<tbody>
<tr>
<td>Question</td>
<td>√</td>
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<tr>
<td>Plan</td>
<td></td>
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<td>√</td>
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<tr>
<td>Interpret and Test</td>
<td>√</td>
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<tr>
<td>Experiment</td>
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This model can also be very good to solve practical problems that exist in the non-governmental institutions of higher learning, teaching plan impermanent.
4. Practice of QPITE Teaching Model

QPITE teaching model has been used in some courses in Hebei Oriental University, such as Data Structure and Algorithm, have already started the practice of two semesters.

Before course selection, the instructor instructs the students to log in their school account online and participate in the course selection test, which mainly includes the previous knowledge related to the course, such as "Discrete Mathematics" and "Probability Theory".

The course selection test will automatically produce the results, and analyze. Then teacher can determine the teaching plan of this course (different textbooks will be selected according to the class level or the same class according to the difficulty level), and separately list the teaching plan for students who are far below or above the average line;

According to the test results of each student, Teacher feedback the previous knowledge that students need to review, and give students the corresponding bibliography according to the test results;

The whole course is conducted in the computer room, and part of the chapters are taught by MOOC or distance learning. In class, teachers mainly answer questions. In key chapters, teachers adopt the simultaneous method of classroom test and classroom teaching to understand students' learning situation in real time. Then the teacher can adjust the corresponding teaching plan in real time according to the students' learning situation.

The experiment was conducted in the open computer room of the school. The students booked the computer time by themselves and completed the experiment work and experiment report independently. The students in the experiment were divided into several groups. The teacher of each group gave online guidance and answer questions respectively. The teacher of the experiment report gave online correction and score, and referred to the students' internal score and self-score.

After the course, use the summer vacation time to have a big experiment. The topics of the experiment (project) are set by the instructor, and each topic can only be selected by a group of students. Students can be divided into groups of three to five people. Students can choose the group leader and team members by themselves, and choose the topics suitable for the group, and the group leader will report the situation of the groups and topic selection to the teacher.

5. Conclusion

Private colleges and universities are faced with the situation of weak teachers and uneven student foundation. Therefore, private colleges and universities urgently need to change the teaching mode which is not suitable for the actual situation. Using the new technology in the Internet era, the private colleges and universities adopt the QPITE self-adaptive adjustment teaching model. The model has achieved good results in the initial practice.

Acknowledgement

Research and practice of QPITE teaching mode of "Data Structure and Algorithm" in private colleges and universities in the Internet era.

References