Discussion on online and offline mixed teaching reform of computer majors in universities

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Abstract: Blended teaching has been widely studied and practiced in the field of education and training at present, especially in college computer majors, and its application is more and more common. With the continuous progress of modern network technology, the exploration of blended teaching is also deepening. Therefore, online and offline blended teaching is considered to be an important trend of education reform and the direction of future development. Under the background of the rapid development of the Internet, this new model of education has obviously become an inevitable choice for future education. Based on this, this paper analyzes the background and development trend of hybrid teaching, as well as the advantages and limitations of its application in computer majors, and discusses the specific strategies of the reform of online and offline hybrid teaching for computer majors in colleges and universities.

Key words: Universities; Computer; Online and offline; Blended teaching

I. Background and development trend of online and offline blended teaching

As an innovative model in the field of education, online and offline hybrid teaching has been widely concerned and applied in recent years. It combines traditional face-to-face teaching and modern online learning technology, bringing new opportunities and challenges to education and teaching. Combined online and offline teaching makes learning and teaching more flexible by combining online learning platforms and traditional classroom teaching. Students can choose to participate in courses on campus or remotely according to their personal situation, thus improving the convenience and popularization of education. Moreover, the application of educational technology makes it possible to personalize education. According to students' learning styles and needs, teachers can provide customized learning content and support through online resources and tools, which further enhances students' learning effectiveness and motivation. In addition, the online platform also provides a variety of interactive ways, such as real-time discussion, online Q&A, multimedia teaching, etc. These interactive forms enhance the communication and cooperation ability between students and teachers as well as among students, and help stimulate students' learning interest and creativity. With the help of online learning platform, blended teaching realizes the centralized management and sharing of a large number of educational resources, including video tutorials, electronic books, online tests, etc. The integration and optimization of these resources provide students with more extensive and in-depth learning content, which is conducive to the improvement of teaching effect. Through the popularization of digital technology, online and offline hybrid teaching can better serve students with special learning needs or from remote areas. The popularization of this mode has promoted the realization of equity and inclusiveness in education, and provided more students with equal learning opportunities.

II. Advantages and limitations of online and offline mixed teaching mode in computer science

1. Advantages

(1) Blended teaching allows students to choose online or traditional face-to-face learning according to their personal time and learning progress. Computer science majors, for example, can learn theoretical knowledge online and do hands-on and programming exercises in a laboratory environment.

(2) The online platform provides real-time interaction and instant feedback to promote effective communication and learning exchange between students and teachers. It is helpful for computer students to solve difficult problems in computer programming, students can get timely guidance and support, and improve learning efficiency.

(3) Students can access rich learning resources through online platforms, such as video tutorials, open course resources (OER), programming tools, etc. Students are provided with a variety of learning paths and tools to choose from, which is conducive to students' customized learning according to their personal learning styles and interests.

(4) Blended teaching cultivates students' technical practical ability and innovative thinking through online programming experiments and project-driven learning. Computer science majors emphasize hands-on and problem-solving skills, and the blended teaching model helps students apply what they have learned in real projects.

2. Limitations

(1) Stable Internet connection and high performance computer equipment are required to support online learning and programming practice. Some areas or students may face problems such as unstable Internet and old equipment, which affect the learning effect and experience.

(2) Computer science majors emphasize team projects and collaboration, but online learning may reduce face-to-face real-time interaction and teamwork opportunities. The efficiency of communication and teamwork among students may be reduced, which will affect the completion of projects and the learning effect.

(3) Online learning mode requires high self-discipline of students, which may affect the learning motivation and engagement of some students. However, the lack of formal classroom environment and face-to-face learning atmosphere may lead to the decrease of students' learning enthusiasm.

(4) How to effectively evaluate academic integrity and monitor students' learning progress in online learning is a challenge. Problems such as plagiarism in homework and cheating in exams may occur, which need to be solved by effective technical means and teaching strategies.

III. Computer professional online and offline mixed teaching reform strategy

1. Teaching design and curriculum development

Computer educators are actively exploring modular and interactive curriculum structures. Instead of the traditional linear curriculum framework, teachers tend to divide the course content into separate modules, each focusing on a specific topic or skill. This modular design not only makes teaching more flexible, but also allows students to choose an appropriate learning path according to their own learning progress and needs. In addition, in order to effectively support online learning, educators have put a lot of effort into developing textbooks, case studies and practice problems suitable for online learning. Teaching materials are no longer limited to traditional paper textbooks, but enhance the learning experience through multimedia resources, virtual LABS and interactive learning tools. Case studies and exercises are also developed with emphasis on practicality and application to promote students' practical operation ability and problem solving ability in the virtual environment. Finally, different learning paths and elective courses need to be designed to better meet students' diverse academic backgrounds and personal interests. In a traditional classroom, students are usually forced to follow a uniform pace and content of learning, while the advantage of blended teaching is that it can provide students with a more personalized learning experience. By designing diverse learning paths and rich elective courses, students can choose the right courses according to their interests and career development goals, thus stimulating their learning motivation and engagement.

2. Technical support and platform construction

It is very important to evaluate and select the online learning platform suitable for computer majors. These platforms need to not only support large-scale virtual machine experiments and complex programming assignments, but also have good user interfaces and real-time support systems so that students and teachers can effectively conduct distance learning and teaching. In order to ensure smooth teaching and learning, the stability and bandwidth of the school network must be adequately enhanced and managed, including ensuring that it can support large-scale online courses and lab operations, as well as ensuring that students have seamless access to teaching resources and interactive platforms at any time. In addition, providing students and teachers with the necessary high-performance computer equipment and software support is one of the foundations of blended teaching. Hardware and software facilities capable of supporting various programming environments and professional tools are needed both on campus and remotely to ensure the efficiency and quality of teaching and learning.

Designing and implementing secure online learning environments is equally critical. With the popularity of online education, protecting students' and teachers' personal information and academic outcomes becomes a major challenge. Therefore, effective data encryption and network security measures must be taken to ensure information security and privacy protection in the teaching process. Finally, in order to cope with unexpected situations and system failures, a comprehensive data backup and disaster recovery plan must be designed and implemented. These plans not only enable quick restoration of teaching activities in the event of network outages or system crashes, but also ensure that the academic achievements of students and teachers are not lost.

3. Teacher training and teaching team building

Teachers are a key factor in the successful implementation of blended teaching and require specialized training and support. To make effective use of online teaching tools and platforms, schools can implement training courses to help teachers become proficient in these technologies. These courses not only teach basic platform operations, but also how to design interactive and creative distance learning activities to maximize student engagement and learning outcomes. To improve teachers' virtual teaching skills and online interaction, schools can set up specialized educational courses and workshops. These training not only focus on technical operations, but also emphasize how to effectively interact with students, stimulate interest in learning, and ways to solve common teaching challenges in a remote environment. To facilitate collaboration and experience-sharing among teachers, schools can set up specialized platforms and mechanisms. Teachers can share successful teaching practices, innovative curriculum design and effective online teaching strategies on these platforms, thereby jointly improving teaching quality and efficiency. The school encourages teachers to participate in the innovation of teaching methods and in the design of common courses. Through interdisciplinary cooperation and the construction of teaching teams, teachers are able to jointly develop diversified curriculum content in line with modern educational concepts to meet the learning needs of different student groups. To support the online learning experience of teachers and students, the school provides online tutoring and learning support services around the clock. Whether it is technical support or academic counseling, students and teachers have access to help at all times to ensure their learning and teaching process runs smoothly.

4. Teaching effect evaluation and quality assurance

Evaluating the effectiveness of blended teaching and ensuring the quality of teaching is a key step in education reform. In order to ensure multi-dimensional evaluation of teaching quality, schools need to develop detailed evaluation indicators of teaching effectiveness. These indicators cover aspects such as knowledge mastery, practical application ability, innovative thinking and teamwork to

comprehensively reflect students' performance and growth in different learning environments. To collect and analyze student learning data effectively, schools can employ online questionnaires, learning analysis tools and student performance data. Through these tools, teachers and education administrators can accurately grasp the learning progress and needs of each student, identify problems in a timely manner, and take appropriate measures. In order to ensure the quality of teaching and continuous improvement, schools may set up teaching quality review committees or quality assurance teams. These institutions are responsible for supervising and evaluating all aspects of the teaching process to ensure the scientific and effective teaching programs. Schools can also establish mechanisms for continuous improvement. Based on the evaluation results and feedback, teachers regularly adjust and optimize the curriculum to adapt to changes in students' learning needs and technological developments. This feedback mechanism not only helps teachers improve teaching methods, but also promotes the updating and innovation of teaching content. To gain insight into students' learning experience and engagement, schools need to conduct exhaustive data analysis. By analyzing students' online activities, interactions and academic performance, educators can tailor curriculum and teaching strategies to make learning more personalized and effective. Based on feedback from students and teachers, schools adjust curriculum content and teaching strategies. These adjustments not only focus on the transfer of knowledge, but also focus on cultivating students' innovation ability, problem-solving ability and teamwork spirit, so as to comprehensively enhance students' comprehensive quality and professional competitiveness.

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