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Research on Teaching Reform of Computer Network Technology Courses in Universities

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Abstract: As one of the important courses in computer science, the course of Computer Network Technology plays an indispensable role in cultivating technical and skilled talents in the new era of computer science. Based on this, universities have given close attention to teaching the quality and effectiveness of computer network technology. However, the current teaching mode is traditional and one-way, and to a certain extent, it has not combined the characteristics of strong practicality and fast updating speed of computer network technology, which seriously affects the cultivation of professional talents in this field in schools. In order to change this situation, this article will start from two major directions: curriculum construction and teaching method optimization, to deeply explore effective strategies for the teaching reform of computer network technology courses in universities. So that, the teaching effectiveness of computer network technology courses can be improved while meeting the educational needs of the network era, and contributing to the cultivation of excellent computer network technology talents with practical operation ability and innovative thinking.

Keywords: Universities; Computer Network Technology course; Teaching reform

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1. Introduction

Nowadays, computer network technology has widely penetrated into various industries and plays an irreplaceable key role. As the main battlefield for cultivating outstanding computer network technology talents, universities need to change the traditional teaching mode of the past and strive to meet the new changes and requirements of the information era. The Computer Network Technology course aims to help students master knowledge and skills that are in line with social development and the needs of the times by imparting basic principles, network structures, and related network applications of computer networks. Nowadays, the teaching reform of Computer Network Technology courses has become a common concern in the education sector [1].

2. The connotation of computer network technology

2.1. The meaning of computer network technology

The emergence of computer network technology originated from the integration of computer technology and

communication technology, and is a milestone in the process of modern social informatization. Computer network technology not only transcends the limitations of physical space but also breaks down information silos, playing an irreplaceable and important role in the formation of the global interconnection pattern. A computer network can be seen as a collection of dispersed and independent computers connected through various transmission media such as cables, twisted pair cables, optical fibers, and even radio waves [2]. This connection is not arbitrary but should follow certain network protocols to build a high-speed information highway. Computer networks have dual functions. On the one hand, they can achieve the sharing of hardware, software, and data resources, allowing remote computing and storage resources to be accessed and called up in the shortest possible time. On the other hand, computer networks also have the function of centralized processing and maintenance of shared data resources, allowing data to freely circulate between networks, demonstrating strong liquidity and sharing characteristics. This not only greatly improves the efficiency of information processing, but also promotes the development and innovation of the knowledge economy [3].

2.2. Introduction to Computer Network Technology course

As one of the key disciplines that constitute the discipline system of computer science and technology, the computer network technology course occupies a core position, playing an irreplaceable key role in the teaching reform of computer-related majors and promoting industry and social development [4]. In this perspective, most universities list it as a mandatory course for information technology-related majors and as a professional course for computer science postgraduate entrance exams [5]. The core goal of the Computer Network Technology course is to help students fully understand and master the architecture and operating principles of modern computer network systems, and deeply grasp the research trends and technological development trajectory of network technology [6]. The Computer Network Technology course is rich in content and covers a wide range of fields, covering different aspects such as basic theory and practical applications. Students need to deepen their knowledge of network technologies such as network protocols, network architecture, data communication and transmission, network equipment and management, network security and operation [7]. At the same time, they also need to understand the development history of various network technologies to continuously broaden their horizons, consolidate their theoretical foundation, improve their abilities in network system design and software programming, and ultimately lay a solid foundation for their career development, promote social progress, and comprehensively enhance the comprehensive competitiveness of the country [8].

3. Current situation of teaching Computer Network Technology courses in universities

The traditional teaching of Computer Network Technology courses focuses on the theoretical level, such as explaining network systems, network topology, computer networks and other related principles and concepts, but instead does not focus on in-depth exploration of practical applications. In terms of online applications, most of them focus on explaining the working principles of the network. Due to the abstract nature of this content, it is not easy to understand, which greatly weakens the enthusiasm and initiative of students in learning [9]. In addition, the lack of practical applications leads to a lack of interest in learning for many students, who find the course knowledge boring and not conducive to the cultivation and improvement of their practical abilities. In addition, with the rapid progress of technology, emerging network technologies and devices are emerging one after another rapidly [10]. However, teachers may not keep up with the pace of knowledge updates, resulting in outdated teaching content and, lack of novelty and foresight, which later makes professional education difficult to meet the actual needs of social development, and teaching quality cannot be comprehensively improved [11].

4. Effective strategies for teaching reform of Computer Network Technology courses in universities

4.1. Divide modules and reconstruct content

In this rapidly developing new era of informatization, the role of network technology is irreplaceable. Therefore, based on the original course content, universities must adhere to the basic principles of "Demand-driven, integration of science and technology, and service for positions", to reconstruct and optimize the teaching content of the course, ensure that the education direction meets practical needs, comprehensively improve the teaching quality of the course, and provide assistance for students to play a role in their career positions as soon as possible in the future. To this end, universities can carefully design teaching content according to the three modules of "Network recognition, network construction, and expansion", gradually helping students master the necessary knowledge and skills [12].

(1) The Knowledge Network Module is the starting point of basic teaching in computer network technology courses [13]. It requires students to master the hierarchical structure and development history of networks, and deeply understand the architecture system of network technology. In addition, it also requires students to deeply understand the key role that network technology plays in the development process of various industries, which is particularly crucial for enhancing students' deep understanding of the importance of network technology [14]. Through this learning process, students will establish a stronger sense of service and a higher sense of responsibility, which is an indispensable course content module based on industry needs [15].

(2) The Network Building Module focuses on enhancing students' ability to apply theoretical knowledge to practical. In this module, students should master the knowledge and skills of how to use network devices to build, configure, and manage actual networks. Emphasis should be placed on targeted training of students' skills. At the same time, teachers provide students with practical tasks, requiring them to be fully immersed in the practical environment and flexibly build and adjust networks to achieve the best usage effect.

(3) The Expansion Module focuses on broadening students' horizons. Teachers can regularly organize students to visit and learn from network technology enterprises, aiming to enable students to comprehensively understand the updated and latest development trends and related industry trends in computer network technology, deepen their understanding and cognition of theoretical knowledge, promote the close connection between theory and practice, and improve their network literacy. This plays a crucial role in their future investment in network practical and information management work.

4.2. Online and offline, blended learning

Research has found that nowadays, students generally lack computer network thinking and fear theoretical learning, but they have strong practical skills. Based on the characteristics of contemporary students, to fully mobilize their active participation in the classroom and give them the right to independently choose learning content, teachers can further optimize traditional teaching models. The author has optimized and adjusted the pure offline teaching mode from 60 hours to 12 hours of online courses and 48 hours of offline courses, aiming to adapt to the development trend of educational informatization. The optimized teaching mode is more in line with the learning habits of modern students, greatly improving the learning quality of students and the teaching quality of teachers.

When designing online courses, teachers should follow the principle of flexible selection of important key points and strive to build a learning platform for students that can be accessed at any time and has a clear focus. The selected content is difficult and appropriate, ensuring that students consolidate their knowledge through

repeated learning and practice to continue their learning interests. At the same time, it ensures the progress of students' independent learning and cultivates their ability to learn independently in a targeted manner. In terms of online course offerings, the teaching content chosen by the author includes building office and other networks, building a home Wireless LAN, dividing IP addresses and subnets, configuring switches, and interconnecting LANs. Each knowledge module corresponds to different theoretical and practical knowledge, to help students form a systematic and comprehensive knowledge framework and strengthen their practical application abilities. In response to the teaching content of "Routing Information Protocol in Dynamic Routing Protocol", in the actual theoretical teaching process, the author chose the form of micro lesson teaching, aiming to fully utilize the fragmented time of students and improve their learning efficiency. When creating micro lesson content, the author takes into account the needs and feedback of students, accurately grasps the important key points that students generally think are abstract and difficult to understand, and presents them in the form of vivid cases, stories, and questions. For example, "There are many paths between the two places, how can we save time?" By analogy, the author helps students clarify the knowledge points of this lesson, further break through the difficulties, and grasp the key points, laying a solid theoretical foundation for the following practical operations. For the practical part, the author chose to conduct it in the form of MOOCs, relying on the independent platform of the campus network to upload pre-recorded experimental videos and guide students to design network topology structures themselves. If they encounter difficulties, they can seek help from teachers and classmates directly. This not only helps students to become familiar with operating relevant software tools, but also exercises their practical problem-solving abilities, achieving two goals at once.

4.3. School-enterprise collaboration, comprehensive improvement

The cooperation between schools and enterprises, as well as the integration of industry and education, have become the mainstream trend in the development of higher education. The practical aspect is an effective way to enhance students' comprehensive abilities and should receive the attention of teachers. Universities should actively sign cooperation agreements with enterprises, establish stable cooperative relationships, and help students to have practical contact with enterprises and even specific positions before graduation. This will lay a solid foundation for their future career path, lay the groundwork for subsequent work innovation, and fully implement the teaching philosophy of "integrating teaching and practice." In the actual teaching process of Computer Network Technology courses, teachers can introduce rich enterprise network projects, encourage students to actively mobilize their learned knowledge to fully invest in the real work environment, and actively solve problems encountered. In this way, students will find ways to make up for their shortcomings as soon as possible, thereby creating a "keep up with each other" atmosphere in the classroom, which helps to enhance their comprehensive competitiveness. Through a series of processes such as learning the internet, using the internet, networking, and building a network, students are trained in practical skills through targeted practical training. Specifically, teachers actively negotiate with enterprises to provide students with opportunities to access databases and application systems, and then try to debug devices and networks. This can help students configure networks scientifically and effectively, and significantly highlight their personalized characteristics, achieving the teaching goal of applying what they have learned.

4.4. Emphasize assessment and stimulate innovation

In the actual teaching process, teachers must take a long-term perspective on each assessment stage. It should be noted that imparting theoretical knowledge and improving student performance is not the ultimate goal of teaching. On the contrary, teachers should incorporate practical operation-level assessment into the evaluation

system, striving to achieve the optimal integration of on-campus assessment and off-campus practice. Only in this way can the teaching philosophy of emphasizing both theoretical knowledge and practical skills be highlighted, and students' professional skills and networking abilities be improved unprecedentedly. Only in this way can more excellent computer network technology talents who integrate knowledge and action be cultivated. From the perspective of teachers, they should flexibly adopt the case analysis teaching method, divide students into different learning groups, and encourage them to explore practical networking problems in depth. In this way, relying on rich experience, even though technology is constantly changing and equipment is being updated, students can always accurately network and build networks, and they will have a deeper and more comprehensive understanding of project engineering. In addition, teachers can also encourage students to play the roles of managers and users respectively, to encourage them to flexibly apply their learned knowledge and solve various network problems with innovative consciousness. Of course, teachers should also improve themselves in the direction of assessment, pay special attention to practical operation on computers, and pay attention to the flexible application of multimedia teaching, inquiry-based teaching and other methods, aiming to break conventions, stimulate innovation sparks, cultivate students' abstract and logical thinking, and improve their computing ability.

5. Epilogue

In summary, the teaching reform of Computer Network Technology courses involves various aspects and requires comprehensive planning and gradual implementation to achieve satisfactory results. Reconstruct content by dividing modules, online and offline, blended learning, school-enterprise collaboration, and comprehensive improvement are the core task of current and future educators to exert importance to assessment, stimulate innovation and other measures, further improve the effectiveness of teaching, and lay a solid foundation for students' future career paths.

Disclosure statement

The author declares no conflict of interest.

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