Research on the Innovation of "Computer +" Professional Training Mode in Application Oriented Universities under the Background of New Engineering

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Abstract: This paper under the background of new engineering applied undergraduate colleges and universities "computer +" professional personnel training mode is studied, first discusses the common characteristics of "computer +" professional, under the background of new technology, puts forward a new talent "computer +" professional training objectives, requirements "computer +" professional to adapt to the new engineering background, professional personnel training mode innovative reform.

1. Introduction

As the world enters the industry 4.0 era and develops at an exponential speed, China is vigorously implementing a series of major strategies including innovation-driven development, "made in China 2025", "big data", "artificial intelligence" and "One Belt And One Road". In order to adapt to the world's industrial development speed and China's strategic development needs, and to support the new economy characterized by new technologies, new formats, new industries and new models, China's higher engineering education is in urgent need of reform and innovation[1, 2]. In order to occupy the first mover advantage in future competition in overall national strength, occupy the strategic point in the future global innovation ecosystem, February 18, 2017 the ministry of education was held in Fudan university higher engineering education development strategy seminar, a total of 30 colleges and universities to participate in the meeting, the participants discussed the new connotation of engineering characteristics, engineering construction and the development path selection, reached a "consensus" Fudan, the conference marked the official opening of new engineering construction; On April 8, a seminar was held in Tianjin university on new engineering construction of universities with engineering advantages to form a "new engineering action line". On June 9th, the expert group on new engineering research and practice was held in Beijing and the first working meeting was held[3,4].

2. The Connotation of "Computer +" Major.

"Computer +" refers to the computer as a basic like higher mathematics, college English professional knowledge, more than ever the computer basic operation or a programming language knowledge ability, have to some kind of microprocessor hardware design, software development ability, the ability of integrated hardware and software, students need to have strong ability to develop hardware and software of the actual operation ability and the ability of software and hardware joint debugging and optimization.

The new "computer +" majors include: Internet of things engineering, network space security (information security), service science and engineering, robotics, data science and big data technology, digital media technology, intelligent science and technology, network engineering, computer + application industry/field.

"Computer + major" can include electronic information engineering, communication engineering, mechanical design and many other traditional and computer-related majors, but also can include

professional knowledge plus computer development and application ability, and computer skills to their professional application skills.

The abilities required by "computer +" professionals are: theoretical analysis and abstraction ability, problem understanding and solution ability, system analysis and design ability, system development and implementation ability, system application and management ability, practical experience and hands-on ability, continuous learning and improvement ability.

Current situation of "computer +" major

3. Current Situation of "Ccomputer +" Major

Our university is an application-oriented undergraduate, and the university is facing the transformation and development. The three first-level disciplines of computer, machinery and electronics are in one college -- school of engineering, which has ten second-level disciplines. Computer is the basic skill of these majors. How to carry out the innovation and reform of "computer +" according to the existing professional status, the integration of disciplinary advantages.

4. Teaching Strategy and Teaching mode Innovation Construction of "Computer +" Major

With the rapid development of modern educational technology, colleges and universities are exploring some emerging educational technologies and methods to meet the learning styles and needs of engineering students. At the same time, teachers have felt the new teaching pressure: reduce the teaching hours, increase the opportunity of deep learning, make the learning environment more interactive, timely use of collaborative learning strategies, and widely integrate technology into the learning experience, teaching and learning relationship is more seamless, teaching and learning activities are constantly interactive between teachers and students.

4.1. Cooperative Learning.

According to the Jonathan brothers from the center for cooperative learning at the university of Minnesota, five elements are indispensable for cooperative learning: positive interdependence, face-to-face interaction, personal responsibility, social skills, and group "self-processing"[5,6].

Integrate cooperative or collaborative learning strategies into the curriculum, encourage the creation of learning communities, value the participation of teachers and students in the learning process, and stimulate student/teacher discussion.

4.2. Integrate Educational Technology and Create Virtual Learning Environment.

Educational informatization has its own basic characteristics. From the technical point of view, the basic characteristics of educational informatization are digitalization, networking, intelligence and multimedia. The digital teacher's educational information technology system has simple equipment, reliable performance and unified standards. The network makes the information resources sharable, the activity time and space limit less, the interpersonal cooperation easy to realize. Intellectualization enables the system to achieve humanization of teaching behavior, intellectualization of man-machine communication and multifarious task agency. Multimedia makes the information equipment integration, the information representation diversification, the real phenomenon virtualization.

At present, virtual reality, artificial intelligence and robot technology as a disruptive black technology has been recognized by all sectors of society, and caused the education sector, academia and industry attaches great importance to. AR/VR represented by "immersive experiential education research" has become the future of education and experiential learning of the new paradigm[7,8].

Information technology broadens the concept of a learning environment so that the learning experience can be extended beyond the traditional classroom. Virtual learning technologies can take many forms, such as interactive collaboration/discussion, moocs, video meetings, virtual reality, and augmented reality.

4.3. To Enhance the Effectiveness of Interdisciplinary Teachers' Teamwork and Interdisciplinary Cooperation

Since the 21st century, it has become the main idea of curriculum reform in many countries to break the subject-centered curriculum structure and implement interdisciplinary education that combines multidisciplinary integration, basic knowledge and ability integration, and the breadth and depth of knowledge. China's new curriculum reform has also formally integrated "interdisciplinary" integrated curriculum into the new curriculum system. Interdisciplinary education is a typical collaborative education, which requires teachers with different knowledge structures and backgrounds to set up teams, break down disciplinary barriers, achieve disciplinary integration, and promote the achievement of teaching objectives. Educators are exploring ways to share facilities, lectures, classrooms and laboratories with other scientific disciplines, and are looking for opportunities for broader academic collaboration.

4.4. Attach Importance to Undergraduate Scientific Research and Promote the Interaction between Teachers and Students

Undergraduate research provides students with the opportunity to learn new knowledge and skills, which can teach them many valuable skills. Students gain valuable experience in experimental data collection, statistical analysis and data visualization.

Connecting with passionate and inspiring teachers is one of the most important factors in a student's success. The positive interaction between teachers and students is conducive to creating a democratic classroom environment, promoting students' skills and emotional development, cultivating students' academic self-concept, and improving students' learning enthusiasm and success rate.

4.5. Practice Interaction, Deep Learning

Practical interaction refers to that during the brief teaching period, hands-on experiments and problem-solving activities are interwoven regularly, which is conducive to the immediate application of knowledge and skills to practical problems. In recent years, many colleges and universities at home and abroad are committed to the design of a student-centered active teaching environment, so as to give full play to the full learning potential of students, which has not been paid attention to in the traditional teaching mode.

4.6. Blended Learning

Blended learning is a new term in the field of education, but its concepts and ideas have been around for years. According to Learning circuits in the United States, blended Learning is considered a combination of online and face-to-face Learning[9,10]. In essence, blended learning is a new type of learning method or learning philosophy. It refers to the learning method that properly combines traditional learning means and online learning means in e-learning and enterprise training according to the viewpoint of system theory and performance method. Its goal is to make learning easier and more convenient, so as to achieve the best learning effect. It is based on the learning performance indicators of enterprises and organizations.

The rapid development of information and communication technology (ICT) has had a wide and far-reaching impact on all fields and has become one of the indispensable elements of the 21st century. Since ICT was introduced into the field of education, with the development of science and technology in recent years, blended learning has been widely popularized and made remarkable progress.

5. The Theory and Practice Training System of "Computer +" Majors in Application Oriented Universities under the Background of New Engineering Design

The new "computer +" majors include: Internet of things engineering, network space security

(information security), service science and engineering, robotics, data science and big data technology, digital media technology, intelligent science and technology, network engineering, computer + application industry/field.

1) General knowledge: humanities and social sciences, foreign languages, economics and law.

2) Basic theories: basic theories of mathematics, computer science and software engineering.

3) Basic professional knowledge of "computer +X".

4) Program design and software development, computer system and software system.

5) "computer +X" professional core technology

6) Computer and software engineering core technology, database and information system.

7) Internet technology and its application.

8) Knowledge of professional crossover, innovative practice and industry application.

6. Conclusion

This paper under the background of new engineering applied undergraduate colleges and universities "computer +" professional personnel training mode is studied, first discusses the connotation of "computer +" professional, "computer +" professional status and common characteristics of "computer +" professional, under the background of new technology, puts forward a new talent "computer +" professional training objectives, requirements "computer +" professional to adapt to the new engineering background, professional personnel training mode innovative reform. Design the teaching strategy, teaching mode innovation and construction of "computer +" specialty, and design the training system of "computer +" specialty in application-oriented undergraduate universities under the background of new engineering.

Acknowledgements

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