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How to Develop Functional Experiment under the New Quality Productivity

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Abstract

As an independently offered comprehensive medical experiment course, functional experiment takes live experimental animals as the main research object to explore the normal physiological activities and laws of the body, the process and pathological changes of disease development, and the effects and mechanisms of drugs. It breaks down the barriers between the originally independent physiology experiments, pathophysiology experiments, and pharmacology experiments in the traditional medical education process, aiming to explore the transformation from applied medical talent to high-quality medical talent and then to innovative medical talent. This article organically combines the concept of new productive forces with the teaching of functional experiments, examines each link in the teaching process from a brand-new perspective, and proposes targeted and operational innovative development strategies, including the introduction of cutting-edge technologies to build an intelligent experimental teaching platform, the implementation of cross-disciplinary integrated comprehensive experimental projects, and the establishment of a teaching model of industry-university-research collaboration, etc., aiming to provide innovative ideas and practical guidance for the reform of functional experiment teaching. The article discusses aspects such as the integration of virtual experiments, humanistic quality education, and curriculum reform.

Keywords

New Quality Productivity, Functional Experiments, Significance, Medical Education, Strategy

1. Introduction

The new quality productivity of medical education is a relatively new concept. It

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refers to the ability to improve the quality and efficiency of medical education by applying modern scientific and technological means, especially the Internet, big data, artificial intelligence, and meta universe and other emerging technologies, especially in functional experimental teaching [1]. Functional experiments, as an important practical part of medical education, are of crucial significance for students to master knowledge of physiology, pathophysiology, pharmacology, and cultivate clinical thinking and practical operation abilities. However, the current experimental teaching of functional medicine faces many challenges, such as outdated teaching concepts, outdated technical methods, and rigid teaching models, which are difficult to meet the demand for innovative and versatile medical talents in the development of new quality productivity. Therefore, exploring the development path of functional experimental teaching under the new quality productivity is of great practical significance for improving teaching quality and cultivating professional talents who can adapt to the development of medicine in the new era [2].

Foreign countries have always emphasized the cultivation of practical ability and innovative thinking in functional experimental teaching, actively introducing advanced technological equipment and teaching methods such as virtual simulation experiments, problem-based learning (PBL), etc., so that students can better master knowledge and skills in experiments, and cultivate teamwork and self-learning abilities. The experimental teaching of functional science in China is also constantly reforming and developing, and some universities have begun to try to integrate new technological means into the teaching process. However, there is still significant room for improvement overall, and there is still a certain gap compared to advanced levels abroad in terms of updating teaching concepts, deep application of technology, and systematic innovation of teaching models [3].

2. Analysis of the Current Situation of Functional Experiment Teaching

2.1. Analysis of the Current Situation of Functional Experiment Teaching

Emphasizing theory over practice: In traditional functional experimental teaching, there is too much emphasis on imparting theoretical knowledge, while insufficient emphasis is placed on cultivating students' practical operational abilities. Experimental courses are often seen as auxiliary means of theoretical teaching, with relatively few experimental hours, making it difficult for students to fully master experimental skills within a limited time [4]. Lack of innovative guidance: In the teaching process, teachers usually adopt traditional teaching methods and teach according to established experimental steps and methods, leaving students with limited space for independent thinking and innovative exploration. This teaching method is not conducive to cultivating students' innovative thinking and independent problem-solving abilities, and it is difficult to meet the demand for innovative talents in new quality productivity [4].

2.2. Outdated Teaching Technology

Outdated experimental equipment: Some functional laboratory equipment in universities is aging and updating slowly, making it difficult to meet the needs of modern experimental teaching. For example, the accuracy and stability of some physiological signal acquisition systems are poor, which affects the accuracy and reliability of experimental data; Some traditional experimental instruments are complex to operate, which is not conducive to students' learning and use.

Single experimental method: Traditional functional experimental methods are mostly confirmatory experiments, and students mainly repeat the steps in the textbook to verify known theoretical knowledge. This single experimental method lacks the cultivation of students' comprehensive abilities and cannot stimulate their interest and enthusiasm for learning.

2.3. The Teaching Mode is Rigid

Lack of teacher-student interaction: In classroom teaching, teachers are often in a dominant position, students passively receive knowledge, and there is less interaction and communication between teachers and students. When teachers explain the principles and steps of experiments, students lack opportunities to actively ask questions and participate in discussions, resulting in insufficient understanding and mastery of knowledge.

Group cooperation becomes a formality: Although some experiments are conducted through group cooperation, in practical operation, group cooperation often becomes a formality, and there is a lack of effective division of labor and collaboration among students. Some students have low participation in group experiments and exhibit a phenomenon of "free riding", which affects the cultivation of teamwork skills.

3. Practical Exploration of Innovative Development in Functional Experimental Teaching Driven by New Quality Productivity

3.1. Combining Virtual Experiments under the New Quality Productivity

The cultivation of medical talents must focus on strengthening practical teaching, taking the application of information technology as an important means to improve teaching quality, improve the comprehensiveness of experimental teaching disciplines, technology progressiveness and method inquiry, and achieve a new breakthrough in experimental teaching effect. "Functionology" is the core basic course of medical colleges and belongs to experimental science. Virtual experiments effectively combine theory with practice, and have obvious effects on cultivating students' experimental ability, scientific research ability, clinical thinking and comprehensive quality. Medical experimental teaching is an important link in cultivating medical students' practical ability, innovation ability and comprehensive quality.

The medical virtual simulation experimental teaching demonstration platform is guided by cultivating outstanding talents, continuously enriching exploratory experiments, integrating human functional experiments, and promoting the application of information technology, artificial intelligence, and virtual simulation technology in medical experimental teaching. It constructs a "trinity" experimental teaching system that combines animal experiments, human experiments, and virtual simulation experiments based on ESP. It closely integrates basic and clinical applications, and explores new models of medical experimental teaching. Providing sufficient time to promote students' thinking can provide abundant resources to further inspire their thinking. Virtual experiments can promote students to have sufficient time.

Under the conditions of resources, engage in thinking activities and select the appropriate level of difficulty based on one's own situation to start training, ultimately achieving deep thinking. When designing virtual experiments, teachers should closely focus on inspiring thinking in teaching design. By using multimedia animations, introducing cases, asking questions, and discussing, students can spend more time thinking about scientific problems, deeply understanding theoretical knowledge, and fully utilizing the important role of functional virtual experiments in medical education.

The education mode of "Internet+" will gradually become a trend. The teaching form is no longer confined to the classroom. Virtual experiment operation effectively simulates the operation steps of the experiment. The previous single teaching method has limited scope of application and cannot comprehensively cultivate the comprehensive quality of students. In the future, a combination of online and offline teaching methods can be used to enhance students' interest in learning and achieve better teaching results. Teachers need to carefully consider the characteristics of experimental content and teaching methods, and combine multiple teaching methods to not only compensate for the limitations of a single teaching method, but also better enhance students' interest in experiments, truly achieving the combination of theory and practice.

3.2. Under the New Quality Productivity, Humanistic Quality Education Should Occupy a Certain Position

General Secretary Xi Jinping clearly pointed out at the National Conference on Ideological and Political Work in Colleges and Universities that we should make good use of classroom teaching as the main channel, which means that various courses and ideological and political theory courses should go in the same direction and form a synergistic effect. Based on the characteristics of the curriculum and medical students, there are rich patriotic materials in multiple disciplines of functional experimentation. It is necessary to be good at exploring ideological and political elements such as life education, medical ethics education, patriotism education, legal education, and teamwork spirit in functional experimentation teaching, and to study and explore the path and methods of organic integration between functional experimentation teaching and ideological and political education [5].

The theoretical knowledge of physiology, pharmacology, and pathophysiology carries the struggle history of generations of scholars and doctors who shoulder missions, full of the scientific spirit of seeking truth and pragmatism and the noble character of dedication. Integrating the oath of medical students, the sincerity of doctors, and the struggle history of scholars and physicians into teaching objectives and learning requirements can help cultivate students' spirit of hard work, self-discipline, and serious learning attitude, laying a solid foundation for the good professional ethics of medical workers. Cultivate students' scientific attitude of seeking truth from facts, objectivity, and rigor from the perspective of value guidance. In the "Laboratory Rules", teachers list laboratory safety cases to enhance students' awareness of safety responsibility, cultivate the habit of operating according to regulations, and cultivate students' serious attitude, strict requirements, and rigorous methods. Through the full process of ritual infiltration of bioethical education, students start from caring for animals, learn how to care for others and patients, and then cultivate students' compassion. Through experiments, cultivate students' teamwork spirit of unity, cooperation, mutual respect, kindness, and friendship. Not only can it enable students to experience job roles in advance, which is beneficial for their career planning and development, but it can also enhance communication among students, make them willing to engage in team assignments, care for and help classmates, cultivate their ability to unite and cooperate, and team consciousness. It can also improve the practical skills of college students, stimulate their enthusiasm for learning, cultivate their spirit of cooperation, and form their ability to learn independently, promoting their comprehensive development.

3.3. Curriculum Reform under the New Quality Productivity

Functional experiments integrate the basic medical experimental courses of physiology, pathophysiology, and pharmacology, and are an experimental discipline that studies the normal functions of the body, the mechanisms of disease occurrence, and the laws of drug action. Due to the complexity and comprehensiveness of its learning content, in order to better understand and absorb theoretical knowledge, and effectively strengthen students' hands-on operation, problem analysis, problem-solving and other abilities [6].

4. Guarantee Measures for the Development of Functional Experimental Teaching under the New Quality Productivity

4.1. Construction of Teaching Staff

Teacher training and further education: Regularly organize teachers to participate in training and academic exchange activities on new technologies and methods, so that teachers can timely grasp cutting-edge knowledge and advanced teaching techniques in the subject, and constantly update teaching concepts and methods. For example, selecting teachers to participate in training courses on virtual reality

technology, artificial intelligence technology, etc., to enhance their ability to use new technologies for experimental teaching [7].

Innovation of incentive mechanism: Establish a sound teacher teaching incentive mechanism, commend and reward teachers who have outstanding performance in experimental teaching reform, and encourage teachers to actively participate in teaching research and innovative practice. For example, establishing a special incentive fund for teaching reform projects to provide funding support and performance rewards to teachers who carry out innovative experimental teaching projects [8].

4.2. Teaching Resource Guarantee

Update and maintenance of experimental equipment: Increase investment in the construction of functional laboratories, timely update and supplement advanced experimental equipment, and ensure the smooth implementation of experimental teaching. At the same time, establish a sound equipment maintenance management system, strengthen the daily maintenance and upkeep of equipment, extend the service life of equipment, and improve the utilization rate of equipment [9].

Virtual simulation resource development and sharing: Organize a professional team to develop high-quality functional virtual simulation experimental resources, and establish a resource sharing platform to achieve resource sharing within and between schools. By utilizing virtual simulation resources, we can alleviate the problem of limited experimental teaching resources and provide students with more opportunities for experimental learning [10].

4.3. Innovation in Teaching Management

Flexible teaching management: Implement a flexible teaching management system to give students more autonomy and learning flexibility. For example, allowing students to independently choose experimental projects and time based on their learning progress and interests; Establish a credit system and flexible education system, encourage students to take elective courses across disciplines and majors, and broaden their knowledge and perspectives [11].

Diversified teaching evaluation: Build a diversified teaching evaluation system to comprehensively evaluate students' learning process, experimental skills, innovation ability, and overall quality. The evaluation methods include classroom performance, experimental reports, group projects, exam scores, scientific research achievements, etc., focusing on process evaluation and formative evaluation, comprehensively and objectively reflecting students' learning situation and ability level [12].

5. Conclusion and Prospect

5.1. Research Summary

This study explores in depth the innovative development path of functional experimental teaching under the new quality productivity. Through an analysis of

the current teaching situation, the problems and shortcomings in teaching are identified. Combined with the connotation and characteristics of new quality productivity, strategies for reform and innovation are proposed from the aspects of teaching philosophy, technical means, teaching mode, and guarantee measures [13]. Practical exploration has shown that these innovative measures can effectively improve the quality and effectiveness of functional experimental teaching, cultivate students' innovation ability, practical ability, and comprehensive quality, and provide strong support for the development of medical education [14].

5.2. Future Outlook

With the continuous advancement of technology and the development of society, the application of new quality productivity in functional experimental teaching will continue to deepen and expand. In the future, we should further strengthen the deep integration of technological innovation and teaching, continuously optimize the allocation of teaching resources, improve teaching management mechanisms, cultivate a high-quality teaching staff, and promote the advancement of functional experimental teaching to a higher level. At the same time, we should pay attention to the new challenges and opportunities brought by the development of new quality productivity, constantly explore new teaching methods and means, and make greater contributions to cultivating outstanding medical talents that meet the needs of the new era.

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Authors' Contributions

PXC designed and supervised the study, ZYH reviewed the references, ZYH wrote the manuscript, PXC revised the manuscript, ZYH and PXC acquired funding.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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