

Integration of Multi-disciplinary Perspectives to Explore the Optimization of Preventive Medicine Curriculum System and Teaching Strategies

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Abstract: With the increasingly complex challenges faced by the field of public health, the importance of preventive medicine in promoting health and preventing diseases has become increasingly prominent. However, the current preventive medicine curriculum system has some issues in teaching methods, practical teaching, teaching methods, and teacher construction, which have restricted the improvement of its teaching quality and the development of the discipline. This article aims to explore the optimization strategies for the preventive medicine curriculum system by introducing case analysis, utilizing information technology, conducting team-based collaborative learning, strengthening the construction of practical teaching bases, and introducing interdisciplinary talents, to promote the innovation and development of preventive medicine courses. The implementation of these strategies will help improve the teaching quality of preventive medicine courses, cultivate preventive medicine talents with innovative spirit and practical abilities, and provide strong support for the development of public health.

1. Introduction

With the continuous intensification of global public health challenges, preventive medicine, as an important pillar of the public health field, has become increasingly prominent in its status and role. Preventive medicine aims to prevent the occurrence of diseases and promote the health of the population through scientific methods and means, thereby improving the overall health level. However, current preventive medicine education faces many challenges, which have seriously restricted the development of preventive medicine education and affected the quality of talent cultivation in preventive medicine. This article will explore the importance of optimizing the preventive medicine curriculum system and teaching strategies from a multi-disciplinary perspective, aiming to improve the quality of preventive medicine education and cultivate medical talents with interdisciplinary knowledge and innovative abilities.

2. Characteristics of Preventive Medicine Curriculum System

2.1 Interdisciplinary Nature

The interdisciplinary nature of the preventive medicine curriculum system stems from the comprehensive nature of preventive medicine itself. It is not limited to the traditional medical field but also covers knowledge from various disciplines such as biology, environmental science, social science, and public health policy. This interdisciplinary nature enables preventive medicine to break through the barriers of different disciplines in the process of education and research, integrating knowledge and methods from different fields, providing students with a more comprehensive and in-depth academic perspective. Through interdisciplinary learning, students can better understand the essence of preventive medicine, grasp its crucial role in promoting health, preventing diseases, and improving medical services, laying a solid foundation for their future career development. The interdisciplinary nature also promotes exchanges and cooperation between preventive medicine and other disciplines, driving the integration and innovation of disciplines, injecting new vitality into the development of preventive medicine ^[1].

2.2 Practicality

As an applied science, the fundamental purpose of preventive medicine is to transform theoretical knowledge into practical applications, thereby improving public health conditions and reducing disease risks. Therefore, practicality occupies a crucial position in the preventive medicine curriculum system. Through practical teaching activities such as community health surveys, disease risk assessments, and health education, students can participate in the practical work of preventive medicine, gaining a more intuitive understanding of the core concepts and practical applications of preventive medicine ^[2]. This practical teaching method not only helps students consolidate theoretical knowledge, but also cultivates their practical abilities and innovative thinking, enabling them to better adapt to the needs of future public health work. Practical preventive medicine courses can also be closely integrated with public health practices, providing strong talent support for the development of public health.

2.3 Innovativeness

With the rapid development of medical science and continuous changes in public health challenges, the field of preventive medicine also needs to constantly update knowledge, explore new methods and theories. Therefore, innovativeness has become an indispensable part of the preventive medicine curriculum system. The curriculum system should focus on cultivating students' innovative thinking and innovative abilities, encouraging them to bravely try new research methods and technologies, and promoting innovation and development in the field of preventive medicine. By introducing cutting-edge scientific research achievements, carrying out innovative experiments and research projects, the curriculum system can stimulate students' research interest and innovative spirit, providing them with a broad academic perspective and practical opportunities. Innovativeness is also an essential guarantee for the preventive medicine curriculum system to adapt to social development needs and cultivate high-quality medical talents ^[3].

3. Issues in the Preventive Medicine Curriculum System

3.1 Unreasonable Curriculum Setup

With the rapid development of medical technology and constant changes in social public health needs, the demand for talents in the field of preventive medicine is also gradually evolving. However, the current preventive medicine curriculum system falls short in terms of course content, structure, and flexibility, making it difficult to fully adapt to these changes. Some traditional preventive medicine courses focus too much on theoretical knowledge transmission, neglecting the cultivation of practical application abilities. These course contents are often outdated and fail to reflect the latest research achievements and technological advancements in the field of preventive medicine, resulting in the knowledge students learn being unable to closely align with current public health practices and difficult to adapt to future work needs. There is also content overlap and intersection between some courses, which not only wastes teaching resources but also increases students' learning burden. Meanwhile, such overlapping and intersecting curriculum settings may lead to confusion among students regarding certain knowledge points, affecting learning outcomes. The curriculum lacks hierarchy and depth, failing to provide different levels of difficulty and depth of course options based on students' learning levels and interests. Current preventive medicine courses often adopt fixed teaching plans and time schedules, lacking sufficient consideration for students' individual differences and learning needs. This results in some students being unable to participate in important course learning due to conflicts with their other arrangements, while others may find the course difficulty too high or too low to meet their learning needs ^[4].

3.2 Weak Practical Teaching Components

As a highly applied discipline, preventive medicine's practical teaching plays a crucial role in cultivating students' practical operation abilities and enhancing their ability to integrate theory with practice. However, the current preventive medicine curriculum is relatively weak in practical teaching ^[5]. In the tight semester schedule, theoretical teaching often takes up most of the time, while practical teaching hours are often compressed, resulting in students being unable to fully participate in and experience the actual work of preventive medicine. This time constraint significantly reduces the effectiveness of practical teaching. Many practical teaching activities in preventive medicine are limited to laboratory operations or simple case analyses, lacking real-world practical experiences. Students find it difficult to truly feel the complexity and challenges of preventive medicine work in simulated environments, thus limiting their practical and innovative abilities. The scarcity of practical teaching resources is also a significant reason for the weakness of practical teaching. Some schools or institutions may lack sufficient practical teaching resources such as laboratory equipment and internship bases due to limitations in funding and space, which restricts the implementation of practical teaching and fails to meet students' practical needs. The issues in the practical teaching components of the preventive medicine curriculum system cannot be ignored. Weak practical teaching not only affects students' practical abilities and innovative thinking but also limits the effective implementation and overall development of the preventive medicine curriculum. Therefore, it is necessary to strengthen and improve the practical teaching components to enhance students' practical abilities and comprehensive qualities.

3.3 Single Teaching Method

Traditional lecture-based teaching still dominates, which, while efficient in knowledge transmission, has significant deficiencies in cultivating students' active learning abilities, critical

thinking, and innovative abilities. The single teaching method leads to students lacking a sense of participation and initiative. They often passively receive knowledge in the classroom, lacking interaction and discussion with teachers, making it difficult to deeply understand the complexity and diversity of preventive medicine. This teaching method limits students' cognitive development, making it difficult for them to form independent thinking and problem-solving abilities. Each student has different learning styles, interests, and abilities, and a single teaching method cannot meet the needs of all students. This results in some students feeling bored or confused in the classroom, lacking learning motivation, while others may not be able to fully utilize their potential due to the unsuitability of the teaching method. Preventive medicine, as a comprehensive and interdisciplinary subject, requires the integration of multiple teaching methods to promote students' comprehensive development. However, current teaching methods are often limited to traditional lectures, lacking the application of diversified teaching methods such as case studies, group discussions, and simulated practices. This makes it difficult for students to obtain a comprehensive learning experience, limiting their improvement in comprehensive qualities. The singularity of teaching methods not only affects students' learning outcomes and interests but also constrains the innovation and development of preventive medicine education. Therefore, it is necessary to explore diversified teaching methods to meet students' personalized needs and promote their comprehensive development.

3.4 Insufficient Teacher Resources

As a comprehensive and interdisciplinary subject, preventive medicine requires teachers to possess profound professional knowledge, rich teaching experience, and extensive disciplinary backgrounds. However, the current field of preventive medicine education is faced with a shortage of teachers, which to some extent, has restricted the development and improvement of the preventive medicine curriculum system. Preventive medicine involves multiple disciplines such as biology, medicine, sociology, psychology, and others, requiring teachers with interdisciplinary knowledge and abilities to guide students. In reality, such teacher resources are relatively scarce, making it difficult for preventive medicine courses to comprehensively cover relevant disciplinary content and meet the needs of students' all-round development. The research and teaching in the field of preventive medicine require the guidance and promotion of high-level teachers, but the number of excellent teachers in this field is limited, unable to meet the increasing demands of teaching and research. This has led to the inability to effectively carry out some important courses and research projects, affecting the development level of preventive medicine education. The imperfect teacher training mechanism is also one of the reasons for the shortage of teachers. The cultivation of preventive medicine teachers requires long-term time and the accumulation of practical experience, but the current training mechanism often cannot meet this demand, making it difficult for new teachers to quickly adapt to the requirements of preventive medicine teaching and research, affecting the quality level of the entire teaching staff ^[6].

4. Optimization Countermeasures for Preventive Medicine Curriculum System

4.1 Enhancing Interdisciplinary Integration

With the continuous evolution and complexity of public health challenges, preventive medicine needs to comprehensively utilize the knowledge and methods of multiple disciplines to address these challenges. Therefore, strengthening interdisciplinary integration can not only enhance the comprehensiveness and depth of preventive medicine courses, but also cultivate students' interdisciplinary thinking and innovative abilities. To achieve interdisciplinary integration, it is first

necessary to comprehensively sort out and integrate existing preventive medicine courses. By setting up interdisciplinary courses or modules, we can integrate knowledge from related disciplines such as biology, medicine, environmental science, sociology, psychology, and so on, into preventive medicine courses. For instance, we can offer an "Environment and Health" course to explore the impact of environmental pollution, climate change, and other factors on human health, guiding students to understand the connection between environmental science and preventive medicine. Strengthening the construction of interdisciplinary teaching teams is also crucial for achieving interdisciplinary integration. We can encourage teachers from different disciplines to cooperate in teaching, jointly design interdisciplinary courses, and conduct interdisciplinary research. We can also invite experts and scholars from other disciplines to hold lectures or seminars on campus, providing students with broader academic horizons and cross-disciplinary knowledge. To ensure the effective implementation of interdisciplinary integration, it is necessary to establish sound interdisciplinary cooperation mechanisms. We can establish interdisciplinary research centers or laboratories to provide a platform for teachers and students from different disciplines to communicate and cooperate. We can also formulate relevant policies and measures to encourage and support interdisciplinary teaching and research activities. Through comprehensive sorting out and integration of courses, strengthening the construction of interdisciplinary teaching teams, carrying out interdisciplinary practical activities, and establishing sound interdisciplinary cooperation mechanisms, we can effectively enhance the comprehensiveness and depth of preventive medicine courses, cultivate students' interdisciplinary thinking and innovative abilities, and cultivate more high-quality talents for the development of public health undertakings.

4.2 Strengthening Practical Teaching Links

Practical teaching can not only deepen students' understanding and memory of theoretical knowledge, but also cultivate their practical operation ability and ability to solve practical problems. Strengthening practical teaching links in preventive medicine and constructing a more comprehensive and practical teaching system are necessary. We should increase the proportion of practical teaching hours. Traditional preventive medicine teaching tends to focus on theoretical teaching, while practical teaching links are relatively few. To improve students' practical abilities, it is necessary to appropriately increase the practical teaching hours to ensure that students have enough time for experimental operations, field investigations, and other practical activities. We should enrich the content and form of practical teaching. Besides traditional experimental operations, we can also introduce various forms such as case analysis, group discussion, simulation exercises, etc., enabling students to apply their knowledge in different contexts and improve their ability to solve practical problems. For instance, we can organize students to conduct simulation exercises on disease prevention and control, allowing them to experience the whole process of disease prevention and control in a simulated environment, thus deepening their understanding of relevant knowledge. The construction of practical teaching bases is an important place for practical teaching, and its quality directly affects the effectiveness of practical teaching. Schools should invest more funds and resources to build a batch of high-level practical teaching bases, providing students with a better practical environment. At the same time, we can establish cooperation relationships with medical institutions, disease control centers, and other units to provide students with more practical opportunities. The assessment of practical teaching should focus on students' practical operation abilities and abilities to solve practical problems, rather than simply evaluating them based on theoretical test scores. We should also establish a feedback mechanism for practical teaching to timely understand the problems and difficulties encountered by students in the practical process, so as to make timely adjustments and improvements to teaching content and methods.

4.3 Innovating Teaching Methods

In optimizing the curriculum of preventive medicine, innovating teaching methods is crucial. To ensure that the course content remains up-to-date and closely aligned with practical needs, a variety of teaching approaches must be employed to stimulate students' interest and initiative. The introduction of case study methods, by selecting typical public health events as cases, guides students to analyze the principles and practical applications of preventive medicine, thereby deepening their understanding of theoretical knowledge. For instance, in analyzing the prevention strategies of the COVID-19 pandemic, students can explore the roles of epidemiological surveys, vaccination, and community management in preventive medicine, enabling them to integrate their knowledge with real-world situations. Utilizing information technology tools such as online courses and blended learning can break the spatial and temporal limitations of traditional classrooms. Online courses allow students to study anytime, anywhere, while blended learning combines online learning with offline discussions to enhance teaching effectiveness. Additionally, virtual reality (VR) and augmented reality (AR) technologies can simulate emergency response scenarios for public health events, allowing students to practice in a simulated environment and improve their emergency response capabilities. Implementing team-based learning by dividing students into groups to solve public health problems can cultivate their teamwork spirit and communication skills, while also training their ability to analyze and solve problems in practice. For example, a project on improving school cafeteria hygiene can be set, where students form teams, divide tasks, and collaborate to propose feasible solutions. Emphasizing practical teaching links by organizing experiments, internships, and social surveys enables students to participate firsthand in public health work and understand the practical applications of preventive medicine. At the same time, strengthening the integration of practical and theoretical teaching ensures that students continuously consolidate and deepen their theoretical knowledge through practice.

4.4 Strengthen the construction of the teaching staff

Excellent teaching staff is the key to ensuring the quality of teaching and promoting the development of disciplines. Therefore, it is necessary to take effective measures to strengthen the cultivation and development of preventive medicine teachers. It is essential to regularly organize academic seminars, training courses, and other activities to provide platforms for learning and communication. These activities will promote teachers to constantly update their knowledge and improve their teaching abilities. Additionally, encouraging teachers to participate in scientific research projects and academic exchange activities will enhance their research abilities and academic influence. Preventive medicine is a comprehensive discipline that requires interdisciplinary knowledge and skills. Therefore, when introducing new teachers, we should focus on their interdisciplinary background and comprehensive abilities to meet the needs of preventive medicine curriculum teaching. For existing teachers, we can cultivate their interdisciplinary thinking and abilities through interdisciplinary training, cooperation projects, and other methods. Establishing teacher evaluation and feedback mechanisms is also crucial; regularly evaluate teachers' teaching effects through student evaluations, peer evaluations, and other methods to discover and solve problems in teaching in time. At the same time, it is important to establish teacher feedback mechanisms to encourage teachers to put forward opinions and suggestions on curriculum construction and teaching reform, thereby promoting the continuous improvement and optimization of the curriculum system.

5. Summary

As an important component of the public health field, preventive medicine plays an irreplaceable role in promoting population health, preventing diseases, and improving overall health levels. Therefore, this research has significant implications for improving the teaching quality of preventive medicine courses, cultivating innovative and practical preventive medicine talents, and promoting the development of public health. This study conducted in-depth analysis and research on the current challenges and issues facing the preventive medicine curriculum system and proposed corresponding optimization strategies. In the future, we should continue to pay attention to the development trends of the preventive medicine curriculum system, constantly improve and optimize the curriculum system to adapt to the constant changes and development needs of society.

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