

Integrating Ideological and Political Education into Pathogenic Biology and Immunology: An Exploration of Curriculum Reform

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Abstract: This study explores the effective integration and implementation of curricular ideological-political education (IPE) within the Pathogenic Biology and Immunology course for higher vocational medical and pharmaceutical programs. Objective: To synergize ideological-political education with discipline-specific knowledge in order to enhance students' professional competence and humanistic values. Methods: Key IPE elements, including patriotism, scientific spirit, humanistic care, and public health awareness, were embedded into the curriculum. Through case-based instruction, pedagogical innovation, and a post-intervention questionnaire survey, the study examined effective approaches for integrating IPE into subject teaching. Results: The research successfully achieved an organic fusion of disciplinary content and ideological-political elements, leading to the development of a novel instructional framework. Feedback from the questionnaire informed iterative refinements to the strategy, which not only deepened students' understanding of core scientific concepts but also strengthened their sense of social responsibility and ethical awareness. Conclusion: This study offers a replicable and effective teaching model that can serve as a valuable reference for curriculum design and pedagogical reform in Pathogenic Biology and Immunology courses within higher vocational medical and pharmaceutical education, ultimately contributing to the holistic development of students' professional ethics and comprehensive competencies.

Keywords: Ideological and political education in courses; Pathogenic biology and immunology; Teaching strategies; Educational research

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1. Introduction

With the profound transformation of the medical paradigm and the continuous advancement of pharmaceutical and medical education, the training objectives for higher vocational medical and pharmaceutical students have significantly evolved. Contemporary education no longer focuses solely on the acquisition of professional knowledge and technical skills but has expanded toward broader domains, particularly the cultivation of comprehensive competencies and professional ethics^[1,2]. This shift not only responds proactively to

emerging trends in the healthcare sector but also aligns precisely with the evolving demands for medical and pharmaceutical talent in the new era.

Pathogenic Biology and Immunology, as a core foundational course in higher vocational medical and pharmaceutical programs, encompasses a complex and extensive knowledge system. It serves not merely as a vehicle for disciplinary instruction but also as a critical bridge linking classroom learning to future professional practice. In this course, we systematically integrate the concept of “curricular ideological and political education” (hereafter referred to as “course-based ideological-political education” or “course IPE”), aiming to organically embed value-oriented education within professional knowledge delivery. The implementation of course IPE not only enhances students’ learning motivation and engagement but also subtly fosters their professional integrity and sense of social responsibility^[3]. Through this integrative approach, students not only master core concepts in pathogenic biology and immunology but also deepen their understanding of the medical profession and clarify their career orientation and developmental trajectory.

Therefore, incorporating course IPE into the teaching of Pathogenic Biology and Immunology represents both an innovative pedagogical exploration and an effective educational practice. Through this integrated model, faculty members can cultivate more well-rounded healthcare professionals, individuals who possess not only solid technical competencies but also strong ethical principles and a profound commitment to societal well-being, thereby contributing sustained momentum to the advancement of China’s healthcare system.

2. Instructional design strategies for course-based ideological-political elements

The essence of course IPE lies in the seamless integration of knowledge transmission and value cultivation^[4]. In teaching Pathogenic Biology and Immunology, instructors must move beyond mere content delivery to emphasize the dual goals of “knowledge acquisition” and “value shaping.” This involves guiding students to reflect on societal issues, contemplate the meaning of their professional roles, and strengthen their sense of mission and responsibility. Accordingly, key ideological-political elements embedded in this course include: patriotism, scientific and exploratory spirit, humanistic care and professional ethics, public health awareness and social responsibility, laboratory safety consciousness, and teamwork and communication skills^[5-7]. By systematically incorporating these dimensions, the course facilitates a deep, organic fusion of disciplinary knowledge and ideological education, thereby advancing the “triple integration” of knowledge acquisition, competency development, and value formation^[8-10]. Specific instructional strategies are outlined below.

2.1. Scientific and exploratory spirit

As a rigorous scientific discipline, Pathogenic Biology and Immunology embodies the principles of precision, logic, and empirical inquiry^[11]. Instruction emphasizes the importance of curiosity, critical thinking, and intellectual courage^[12]. Through guided activities in experimental design, data analysis, and scientific reasoning, students develop a meticulous, evidence-based approach to research. This cultivation of scientific temperament not only reinforces disciplinary understanding but also equips students with the intellectual foundation necessary for future academic and professional success.

2.2. Humanistic care and professional ethics

Medicine is as much a humanistic endeavor as it is a scientific one^[13]. Through clinical case analyses, students are encouraged to recognize that effective medical practice requires not only technical proficiency but also empathy, respect for patient autonomy, and strict adherence to confidentiality. Emphasis is placed on core ethical

principles such as reverence for life, patient-centered care, honesty, and the commitment to heal. By integrating these values into subject-specific content, the course nurtures students' humanistic sensibilities and helps establish a strong moral compass for their future careers^[14].

2.3. Public health awareness and social responsibility

The course maintains strong relevance to public health. Instructors reference historical and recent outbreaks—such as influenza pandemics and cholera disease, to underscore the critical importance of public health preparedness. Discussions further explore the rationale and implementation of key interventions, including infectious disease surveillance, hospital infection control, and vaccination programs^[15]. These measures are not only directly related to the health and safety of every individual but also serve as a crucial foundation for maintaining social stability and development. Through such educational guidance, students are encouraged to grow into key figures in the field of public health with a strong sense of responsibility and mission, contributing their wisdom and strength to the construction of a healthier and safer social environment^[16].

3. Innovative teaching methodologies

3.1. Integration of theory and practice

Instruction extends beyond theoretical exposition to emphasize experiential learning. Real-world case studies contextualize abstract concepts, enhancing relevance and engagement^[17]. Laboratory sessions allow students to validate theoretical knowledge through hands-on experimentation. Additionally, students are encouraged to apply course content to everyday life, such as adopting hygienic practices and participating in health promotion, thereby reinforcing practical competence and appreciating the real-world value of their learning.

3.2. Diversified instructional approaches

A multimodal teaching strategy is employed, including scenario-based learning, small-group discussions, and role-playing exercises. Scenario simulations recreate authentic clinical or public health settings, improving conceptual understanding and retention. Group discussions foster peer collaboration and deepen content comprehension. Role-playing enables students to embody professional roles, enhancing empathy and situational awareness^[18]. These methods are further augmented by digital tools, such as animated visualizations and interactive online platforms, to render complex concepts more accessible and engaging, thereby elevating overall teaching efficacy.

3.3. Enhanced faculty-student interaction

Active dialogue between instructors and students is prioritized. In-class discussions provide real-time feedback on student understanding, enabling timely instructional adjustments^[19]. Post-class conversations allow faculty to address individual learning challenges and psychosocial concerns, offering tailored guidance and support^[20]. Students are encouraged to voice opinions, challenge assumptions, and engage in reflective practice, activities that cultivate critical thinking, self-efficacy, and problem-solving capabilities essential for lifelong professional growth.

4. Evaluation of teaching outcomes

4.1. Expected outcomes of ideological-political integration

This study aimed to develop a tailored course IPE framework for Pathogenic Biology and Immunology in

higher vocational medical education. Through project-based learning, case-integrated instruction, and faculty mentorship, we sought to unify professional training with moral education, ultimately realizing a “triple integration” model that synergizes humanistic education, ideological guidance, and disciplinary competence to produce practice-ready pharmaceutical and medical professionals.

4.2. Questionnaire survey results

At the end of the second semester of the 2023–2024 academic year, an anonymous survey was administered to 67 students enrolled in Pharmaceutical Science Classes 231 and 232 at Guangdong Polytechnic of Industry and Commerce. The survey comprised eight items designed to preliminarily assess whether the integration of ideological-political elements achieved its intended pedagogical objectives (**Table 1**).

Results indicated high overall acceptance: six of the eight items received affirmative responses from $\geq 95\%$ of participants. The items were grouped into three interrelated dimensions that collectively enhance the internal consistency and reliability of the findings:

- (1) Value recognition (Items 1, 3, 8): Students affirmed the necessity and practical relevance of integrating IPE into the curriculum.
- (2) Learning enhancement (Items 2, 6): IPE elements increased learning interest and served as effective mnemonic anchors.
- (3) Ideational influence (Items 4, 5, 7): IPE stimulated deeper reflection on course significance and future career planning.
- (4) Item 5 (“Did the ideological-political content prompt new reflections on your future career planning?”) received a 100% affirmative response, highlighting the course’s significant impact on students’ career identity development—a topic of high personal relevance.
- (5) Item 7 (“Has course-based IPE changed your perception of this subject?”) showed a slightly lower approval rate (92.5%), suggesting that pre-existing cognitive frameworks may resist rapid transformation. This underscores the need to avoid didactic approaches and instead anchor IPE in topics that resonate with students’ lived experiences and interests.

Overall, students readily accepted the “professional knowledge + ideological education” model, viewing it as an integral component of the course. Faculty hope this approach will foster deeper professional identification and cultivate intrinsic motivation for learning.

Table 1. Survey results on the effectiveness of ideological-political integration in pathogenic biology and immunology

No.	Question	Yes (n)	No (n)	Approval (%)
1	Is it necessary to incorporate ideological-political elements into this course?	66	1	98.5
2	Do ideological-political elements increase your interest in learning?	65	2	97.0
3	Does the integration make the course more relevant to real-world applications?	64	3	95.5
4	Do these elements prompt you to reflect further on the course content?	65	2	97.0
5	Do they inspire new insights into your future career planning?	67	0	100.0
6	Do they serve as memorable anchors that enhance teaching effectiveness?	63	4	94.0
7	Has this IPE component changed your perception of the course?	62	5	92.5
8	Does IPE deepen your appreciation and understanding of this course?	64	3	95.5

6. Conclusion

This study demonstrates that integrating ideological and political education into the Pathogenic Biology and Immunology course for higher vocational nursing students significantly enhances learning engagement while cultivating professional ethics and social responsibility. By thoughtfully weaving IPE into scientific instruction, students not only grasp disease mechanisms but also internalize the mission and moral obligations of healthcare professionals. This blended pedagogical model enables students to clearly recognize their future societal roles and ethical duties as caregivers.

Looking ahead, IPE will play an increasingly vital role in higher vocational nursing education. Future efforts should deepen the integration of ideological and disciplinary content, continuously explore innovative convergence points, and refine teaching strategies. Through such sustained innovation, educators can lay a stronger foundation for students' holistic development and professional growth—ultimately nurturing a new generation of healthcare professionals who combine technical excellence with unwavering ethical commitment.

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