

Exploration of Organic Chemistry Curriculum Teaching Reform under the Macro-Pedagogical Framework

Qing Ji, Yanxia Tai

Chemistry and chemical institute, Jining Normal University, Inner Mongolia, China

Abstract

The discipline of organic chemistry in colleges and universities is a number of related professional courses compulsory basic courses. Over the years, the teaching of organic chemistry courses follows the traditional teaching method, often only paying attention to the application of concept theory, but ignoring the ideological and political education significance of the curriculum itself. From the characteristics of organic chemistry itself, point out the current situation of teaching and the shortcomings in the teaching process, so as to express the significance of ideological and political administration of organic chemistry curriculum, and in the process of educational reform, we are exploring ways to integrate the concept of ideological and political education into all aspects of teaching.

Keywords

Curriculum politics, ideological and political courses, organic chemistry, teaching reform.

1. Introduction

China convened the National Conference on Ideological and Political Education in Higher Education Institutions in Beijing from December 7 to 8, 2016. Xi Jinping, General Secretary of the CPC Central Committee, President of the State, and Chairman of the Central Military Commission, attended the conference and delivered a keynote speech. He emphasized that ideological and political education in universities fundamentally addresses three core questions: "what kind of people to cultivate," "how to cultivate them," and "for whom they are cultivated." The conference stressed the need to uphold the principle of "moral education as the foundation," integrating ideological and political work throughout the entire educational process to achieve comprehensive, continuous, and all-around education [1]. This initiative aims to pioneer new frontiers in China's higher education development while charting the course for ideological education in universities, particularly through establishing a "comprehensive ideological education" framework. The core concept of this framework is "curriculum-based moral education," which integrates ideological and political content into all educational components. As Xi Jinping noted, "Every course carries educational value, and every teacher bears educational responsibilities." Universities should vigorously promote classroom teaching reforms with the goal of embedding ideological education into curricula [2].

The "Course Ideological and Political Education" initiative requires educators to systematically identify teachable elements within academic content and strategically integrate them into classroom instruction. However, the STEM disciplines we study—characterized by their extensive theoretical frameworks and strong objective regularities—appear to have little connection with ideological education. This apparent disconnect makes it challenging to establish effective integration points, presenting significant challenges for organic chemistry courses in educational reform.

2. Current situation of organic chemistry teaching

2.1. Characteristics and status of organic chemistry

Organic chemistry is a core course for chemistry majors and serves as a foundational requirement for all chemistry-related disciplines. As one of the four pillars of chemical science, it provides essential guidance and building blocks for advanced studies. The subject encompasses an extensive and complex knowledge system, with organic reactions demonstrating remarkable variability. In essence, this course is characterized by "easy to understand, hard to memorize, and even harder to apply." However, adhering to the principle that "structure determines properties, and properties determine applications," we recommend students master four fundamental aspects of each organic compound: structure, properties, preparation methods, and applications. This approach enables students to grasp theoretical concepts more effectively while avoiding confusion in practical scenarios.

2.2. Problems and deficiencies in organic chemistry teaching

2.2.1. Students

Teachers conduct preparatory research before instruction, which proves essential for developing tailored teaching plans based on their classroom understanding. Given the diversity of universities and varying student backgrounds, curricula must be adapted accordingly. Take Jining Normal University as an example: As a regional institution, most students hail from ethnic minority regions, exhibiting significant differences in academic foundation and learning habits that further hinder their absorption of new knowledge. Considering the discipline's characteristics, students generally perceive organic chemistry as challenging to master. This presents educators with a major challenge—how to achieve balanced instruction while ensuring every student grasps the subject matter. Consequently, integrating ideological and political education into organic chemistry courses proves particularly difficult.

2.2.2. Teachers

Under the framework of "comprehensive ideological and political education", university instructors bear dual responsibilities in both subject knowledge instruction and ideological cultivation. However, traditional teaching practices have often prioritized professional knowledge delivery while neglecting the significance of ideological education. In practice, some educators demonstrate insufficient awareness of integrating ideological education, clinging to outdated notions that such tasks belong solely to ideological counselors. Long-standing constraints from disciplinary thinking persist among certain faculty members. Even when conducting ideological education, they tend to rigidly follow protocols or resort to superficial examples like explaining chemical reactions. They fail to leverage opportunities for ideological integration, lack effective entry points in knowledge transmission, and miss optimal timing for ideological education, resulting in suboptimal outcomes.

3. The necessity of integrating ideological and political education into the teaching syllabus of organic chemistry

3.1. The inclusion of ideological and political education into the teaching syllabus of organic chemistry is an inevitable requirement of the "big ideological and political" pattern

A fundamental challenge in education lies in identifying the right students for cultivation and nurturing successors to socialism. Educators across all disciplines must fully embrace their role as moral guides, integrating ethical education into classroom practices and pedagogical details to seamlessly combine professional knowledge with ideological-political instruction. As university education serves as a critical phase for shaping students' core values, worldviews,

and outlook on life, strengthening ideological-political education in curricula becomes a primary pathway for teachers to cultivate moral integrity. Therefore, incorporating ideological-political education into organic chemistry curricula not only fulfills the needs of higher education's ideological work development but also aligns with the essential requirements of the comprehensive ideological-political education framework.

3.2. The inclusion of ideological and political education into the teaching syllabus of organic chemistry is a necessary condition for improving teaching quality and talent training quality

The report to the 19th National Congress of the Communist Party of China clearly states that the goal and direction of higher education today and in the future is to achieve meaningful development. The primary aim is to transform higher education from initial "quantitative expansion" to "qualitative transformation," with talent cultivation being evaluated based on its alignment with national economic and social development needs as well as students' growth and talent development [3]. The role of organic chemistry in national economic and social development is closely intertwined with ideological and political education, complementing each other. Teaching organic chemistry knowledge and cultivating various professional skills can serve as value support for ideological and political education, enhancing its persuasiveness and thereby improving the teaching quality and training standards of organic chemistry professionals. This demonstrates that incorporating ideological and political education into the curriculum is essential.

4. The significance of integrating ideological and political education into organic chemistry course

The rapid advancement of modern science and technology has transformed university environments. While students today are proactive and critical, their core values remain in flux. Western ideologies and information technologies subtly influence them, making young minds susceptible to these ideas. As a required course for chemistry and biology majors, organic chemistry education carries profound significance. It not only lays a solid foundation for future specialized studies but also serves as a practical discipline rooted in real-world applications. By integrating theoretical knowledge with real-life scenarios, this course helps students gradually develop sound worldviews, values, and life philosophies through continuous learning.

5. Reform exploration of carrying out ideological and political education in organic chemistry course

5.1. Establish ideological and political awareness of this course

Under the framework of comprehensive ideological and political education, educators must actively transform their pedagogical approaches by embracing this holistic educational philosophy. This requires integrating ideological-political elements into every aspect of organic chemistry instruction to enhance the quality of curriculum-based ideological education [4]. Specifically, organic chemistry teachers should maintain correct political orientation and values, strengthen their awareness and capabilities in ideological-political integration, respect students' perspectives, analyze their psychological states, and consciously incorporate ideological-political factors into lesson designs. Furthermore, they need to intensify ideological-political education within classroom teaching practices.

5.2. Pay attention to learning situation analysis and collection

The learning context is a dynamic process that evolves alongside the teaching process. Under the "Comprehensive Ideological and Political Education" framework, teachers must

continuously monitor students' academic progress, living conditions, and ideological attitudes through in-depth analysis. This enables timely evaluation of professional knowledge instruction and ideological education integration. When addressing student concerns, educators should identify their specific challenges and practical needs, allowing organic chemistry teachers to deliver more targeted instruction that genuinely resolves students' issues. As ideological education becomes increasingly embedded in teaching practices, it's crucial for educators to recognize the necessity of comprehensive student engagement. This awareness lays the foundation for systematically integrating ideological education into classroom instruction.

5.3. Attach importance to the construction of teachers

As organizers of the curriculum, teachers play a vital role in students' perception. Building a high-quality teaching team is essential to deliver top-tier organic chemistry courses. As the saying goes, "lead by example." Therefore, educators must possess both professional competence and political integrity, uphold correct values and noble ideals, while continuously enhancing their ideological and political education to set exemplary standards for students. Moreover, educators must strictly discipline themselves in speech habits, behavior, and lifestyle. By establishing role models, we ensure the effective implementation of "curriculum-based ideological education" in organic chemistry classrooms. The school's unified teaching approach clarifies teachers' professional responsibilities and enhances their ability to integrate ideological education into instruction. Additionally, regular workshops and seminars are organized to share teaching research experiences and curriculum management strategies, enabling collaborative problem-solving in educational practices.

It is worth noting that universities should emphasize the unique role of young faculty members in building a comprehensive ideological and political education framework. As the driving force behind achieving these educational goals [5], they bridge the age gap with college students, enabling seamless communication without generational barriers. Young teachers effectively guide students' ideological development while subtly instilling correct worldviews and values through interactions, helping students better understand the significance of ideological education. Compared to older faculty, younger teachers demonstrate heightened professional enthusiasm and dedication, often pursuing self-actualization and personal growth. Therefore, institutions should provide organic chemistry faculty with more continuing education opportunities to enhance peer collaboration and improve their pedagogical expertise and teaching capabilities.

5.4. Optimize classroom teaching

In the framework of "Grand Ideological and Political Education", guided by educational philosophies and curriculum policies, organic chemistry teachers should consistently differentiate their teaching from conventional classroom instruction. This means that during the teaching process, educators must not only cultivate students' professional competencies but also enhance their ideological awareness. Thorough preparation serves as the prerequisite and foundation for effectively integrating ideological-political education with organic vocational education. The content of organic chemistry courses contains numerous ideological-political elements. As long as instructors make adequate preparations before class, conduct in-depth exploration, and prioritize moral cultivation, skillfully incorporating ideological-political educational resources into classroom teaching becomes feasible [6]. For instance, when explaining the chapter on enantiomers, teachers can guide students to understand chiral drug-related knowledge, thereby recognizing how differences in molecular three-dimensional configurations of organic drugs may cause significant harm to human health or even lead to loss of life, thus fostering a rigorous and meticulous scientific attitude. Through lectures on structural characterization of organic compounds, students can objectively understand the development of analytical instruments in China, comprehend the current status of domestic

instrument technology and industry compared to international standards, thereby establishing a sense of national mission and urgency. When discussing carbohydrate chapters, educators can guide students to contemplate the significance of various substances in nature, allowing them to gain a clearer understanding of nature's existence and develop reverence for it. This also encourages students to reflect on the meaning of life, cultivating a worldview of respect and love for living. Teachers can not only actively impart ideological and political resources through specialized courses, but also achieve educational objectives by incorporating negative case studies. For instance, introducing cautionary examples like the "Shuanghui Pork Bile Incentive" scandal, the "melamine-tainted milk powder" incident, and the "Sudan Red" controversy into teaching curricula can effectively instill personal integrity, social ethics, and professional ethics in students. This approach promotes socialist core values while guiding them to recognize social responsibilities [7]. By fostering a deep respect for legal regulations during their school years, students will lay a solid foundation for making informed career choices after graduation.

Organic chemistry, as a highly practical discipline, plays a vital role in nurturing students' innovative capabilities. We all recognize that innovation serves as the driving force behind national progress and development, representing both the core requirement for younger generations and a fundamental aspect of comprehensive quality for college students. Therefore, ideological and political education in organic chemistry must be integrated with fostering students' innovative thinking [8]. The evolution of organic chemistry itself embodies the essence of scientific reasoning and innovative consciousness. This course effectively stimulates students' interest in deep learning, cultivates innovative thinking patterns, and enhances their capacity for creative problem-solving. In teaching practice, educators should emphasize connecting course content with historical research while expanding students' knowledge base through interdisciplinary references. This approach helps students understand that today's innovative achievements are inseparable from the foundational efforts of previous researchers. In the process of innovation, we have clearly recognized the importance of scientific literacy. Given the content of specialized courses and the nature of future careers, students studying organic chemistry must possess relevant scientific literacy. Therefore, while teaching professional knowledge and skills, instructors in organic chemistry must integrate scientific spirit, attitude, and methodology into classroom instruction [9]. For instance, when teaching theoretical knowledge, instructors can present structures, properties, and applications of enantiomers to help students appreciate subtle structural differences that influence natural and practical uses, understand the significance of chiral separation, and develop good work habits while recognizing the importance of rigorous scientific attitudes. Moreover, behind many inspiring real-life stories lie the emergence of concepts and inventions. Organic chemistry teachers can incorporate relevant scientific narratives during lectures, such as biographies of chemists and their contributions, to inspire students' thinking and guide them in embracing challenges, exploration, perseverance, and teamwork in future studies and careers.

Ultimately, the fundamental purpose of education is to cultivate qualified successors for socialism, which means achieving comprehensive development of talents. Therefore, in addition to fostering professional competence and ideological qualities, we should also emphasize the cultivation of vocational competencies. Schools should establish career development courses that focus on specialized training during instruction. Through daily interactions, students can gradually develop positive career perspectives and correct values, laying a solid foundation for their future careers and enabling them to make greater contributions in their professional lives.

6. Conclusion

In this era, we must understand what kind of talents our nation needs and how to cultivate them. The emergence of "curriculum-based ideological education" has clarified this direction. Under the framework of comprehensive ideological education, higher education should nurture talents with both political integrity and comprehensive development. Educators should aim to cultivate virtue and talent, breaking away from traditional mindsets. They should identify elements relevant to organic chemistry teaching within various chemistry-related subjects, integrating contemporary ideological theories into the entire teaching process. This approach seamlessly combines knowledge transmission with skill development and value guidance, ensuring that scientific education and ideological education proceed in tandem. Through this approach, students can gradually grow into qualified successors of socialism while receiving scientific education.

Reference documentation

- [1] Shao Qian and Li Yuemei. "Student Satisfaction and College Chinese Curriculum Teaching in Vocational Colleges Under the 'Grand Ideological Education' Framework" [J]. *Cultural Education Materials*, 2019,25:19-21.
- [2] Si Chuancan, Lin Ying, Han Wenhua, et al. "Exploring Integration Points of Curriculum-based Ideological Education in STEM Majors under the 'Grand Ideological Education' Framework——Taking 'Biochemical Instrumental Analysis' as a Case Study" [J]. *Journal of Jingdezhen University*, 2019,34(2):10-14.
- [3] Shi Xiaoying. Exploring Ideological and Political Education in Art Design Curriculum of Higher Vocational Colleges under the Framework of Comprehensive Ideological Education [J]. *Journal of Hunan Mass Media Vocational College*, 2019,19(2):117-120.
- [4] Chang Weifeng. Teaching of Ideological and Political Courses in Higher Vocational Education under the Framework of Comprehensive Ideological Education [J]. *Cultural Innovation Comparative Studies*, 2019,13:9-10.
- [5] Peng Xinmei, Li Yunping, He Yingu, Wang Jianghe, Zou Hongtao. Initial Exploration of Teaching Reform in Organic Chemistry Course under the Framework of Comprehensive Ideological Education [J]. *Yunnan Chemical Industry Journal*, 2020,47(5):184-187,190.
- [6] Chen Hongjun, Liu Xiu, and Qing Xiangdong. Research on "Course Ideological and Political Education" in Organic Chemistry [J]. *Think Tank Era*, 2019,45:193-195.
- [7] Du Yongfang, A Brief Discussion on How to Improve the Teaching Effectiveness of Organic Chemistry in University Classrooms [J]. *Education and Teaching Forum*, 2019,47:243-244.
- [8] Zhang Yuanyuan. Research on the "Macro-Micro" Thinking Mode in Chemistry [D]. Jinan: Shandong Normal University, 2007.
- [9] Li Xiaoxiao, Zhao Zhigang, and Zhong Ying. "Reform of Advanced Organic Chemistry Teaching in Ethnic Colleges" [J]. *Guangdong Chemical Industry*, 2019,46(13):208.