

Research and Practice on the Development of Senior Undergraduate Programs in Applied Chemistry in Regional Teacher Education Colleges and Universities

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Abstract: With the development of higher education and socio-economic changes, the senior undergraduate program in applied chemistry at regional teacher training colleges and universities is facing unprecedented challenges and opportunities. This paper provides an in-depth discussion of the development status of the program in the current environment, such as the quality of education, teaching resources, and student employment. At the same time, the paper also analyzes the external environmental changes, educational reform and cooperation with industry, and puts forward a series of practical and innovative strategies.

Keywords: Regional Teacher Education Colleges; Applied Chemistry; Senior Undergraduate; Developmental Research

1. Status of Applied Chemistry Programs in Regional Teacher Training Colleges and Universities

1.1 Educational Quality and Teaching Resources

In recent years, with the updating of research equipment and technological advances, some universities have made remarkable progress in the construction of teaching experimental equipment and laboratories, providing students with a richer and more advanced experimental environment. However, for some regional teacher training colleges and universities, their teaching resources are still relatively scarce due to the limitations of financial and technical support, resulting in unsatisfactory experiences for students in experiments and practices. In addition, the selection and updating of teaching materials also directly affects the quality of education. At present, some teaching materials can no longer meet the development needs of modern applied chemistry, and the contents of the teaching materials need to be timely adjusted and updated to meet the new technical and theoretical developments.

1.2 Students' Employment and Social Demand

Students' employment and social demand is an important criterion to measure whether the development of a specialty is healthy or not. In recent years, students majoring in applied chemistry have performed well in the job market after graduation, and have been favored by many enterprises and institutions^[1]. This is due to the fact that the students trained in this specialty have strong practical ability and innovative thinking in practical application. However, at the same time, with the rapid change of society and industry, the demand of enterprises for talents is also changing, which puts forward higher requirements for students' professional skills, comprehensive quality and innovation ability. Therefore, regional teacher training colleges need to constantly communicate and cooperate with enterprises and industries in the cultivation of senior undergraduate majors in applied chemistry, to understand the changes in social demand, and to adjust the direction and strategy of education in time to ensure the employment competitiveness of students.

2. Challenges and Opportunities

2.1 Changes and challenges of external environment

With the acceleration of globalization and the rapid development of technology, the external environment has brought a series of changes and challenges to the senior undergraduate specialty of applied chemistry in regional teacher training colleges. Technological innovations and the development of new materials have led to rapid changes in the field of applied chemistry, placing new demands on teaching

content and methods. Such rapid changes require educational institutions to update their curricula in a timely manner to ensure that students are equipped with the latest knowledge and skills. At the same time, the global trend of environmental protection and sustainable development has also posed new challenges to applied chemistry education, as students not only need to master traditional chemistry knowledge and skills, but also need to be equipped with knowledge related to green chemistry and environmentally friendly technologies. In addition, the increase in international cooperation and exchanges makes it necessary for students to have stronger cross-cultural communication skills and international perspectives. The globalization of the economy has also led to a gradual shift of the chemical industry to low-cost regions, which has brought new opportunities and challenges to the applied chemistry programs in regional teacher training colleges. To cope with these challenges, universities need to work closely with industry to ensure that the content and direction of education are synchronized with industrial development. At the same time, colleges and universities need to strengthen cooperation with foreign universities and research institutions, introduce advanced teaching methods and research results, and improve the international competitiveness of students.

3. Practice and Innovation Strategy

3.1 Innovation of Curriculum System and Teaching Methods

The senior undergraduate program of applied chemistry in regional teacher training colleges continues to explore the innovation of the curriculum system and teaching methods in order to adapt to the ever-changing technology and market demand. Traditional teaching methods tend to emphasize the transmission of theoretical knowledge, while modern teaching models pay more attention to practice and application. For example, a regional teacher training college has opened a new course “Green Organic Synthesis Technology” to address the research of new organic synthesis methods and the needs of the industry. The course not only teaches the latest green synthesis theory, but also combines real industrial cases, allowing students to simulate the production in the laboratory, in-depth understanding of the advantages and disadvantages of various synthesis methods and application scenarios. In addition, the innovative teaching methods provide students with a richer and more personalized learning experience. Taking “Nanomaterials and Applications” as an example, in addition to traditional classroom lectures, teachers also make use of virtual laboratories and computer simulation software to help students understand more intuitively the structure and properties of nanomaterials, as well as their roles in various applications. Meanwhile, project-based learning and teamwork have also been widely introduced into teaching^[2]. Students are required to work in teams to research and solve real industrial problems, which not only hones their practical and innovative abilities, but also enhances their teamwork and interdisciplinary communication skills. In addition, with the development of online education and distance learning technology, many universities have also introduced new teaching methods such as online courses and MOOCs, which breaks the limitations of time and space and provides students with more flexible learning opportunities.

4. Future Prospects and Suggestions

Under the background of the era of rapidly changing technology and continuous industrial development, the education and research of applied chemistry majors in colleges and universities are facing unprecedented opportunities and challenges. In order to better adapt to these changes, it is recommended that colleges and universities further strengthen their cooperation with industry, ensure that the teaching content is synchronized with industrial development, and provide more practical opportunities for students. For example, a university has cooperated with a new material enterprise to provide students with opportunities for internship in the enterprise, so that they can better understand the application of chemical knowledge in practice. In addition, colleges and universities should also strengthen scientific research and technological transformation, transform research results into actual products and technologies, and provide technical support for industrial development. For example, a university has achieved a series of research results in the field of organic synthesis, which have been successfully transformed into new synthesis methods, bringing new development opportunities for the chemical industry. Meanwhile, in order to cultivate more innovative talents, it is recommended that universities further strengthen students’ innovative education and practical training, provide more innovative projects and competition opportunities, and stimulate students’ innovative consciousness and ability. For example, a university has set up a course called “Innovation Experiment”, in which students are required to design their own experiments to solve real scientific research problems, which greatly improves their practical and innovative abilities. Finally, considering the background of globalization, it is suggested

that colleges and universities further strengthen international cooperation and exchanges, and provide students with more opportunities for overseas study and research, so as to broaden their international horizons. For example, a university has established cooperative relationships with a number of well-known universities overseas, providing students with opportunities for exchange and short-term study visits, enabling them to communicate and cooperate with international experts and scholars, further enhancing their international competitiveness. Overall, for the senior undergraduate program of applied chemistry in regional teacher training colleges and universities, the future outlook and suggestions are the key to its sustainable development, and the colleges and universities need to continue to innovate and forge ahead in order to make a greater contribution to the development of the chemical industry and education.

Conclusion

After in-depth research and analysis, regional teacher training colleges and universities have demonstrated their unique advantages and challenges in the development of senior undergraduate majors in applied chemistry. These colleges and universities have already achieved remarkable results in teaching, scientific research and social service by continuously improving the quality of education, optimizing teaching resources, actively connecting to the needs of the society, and combining with regional characteristics. Facing the changes in the external environment and the challenges of education reform, the universities have realized the two-way mutual benefits of education and industry through in-depth cooperation with the industry. At the same time, they emphasize practice and innovation strategies, provide students with rich practice opportunities and innovation platforms, and cultivate a group of applied talents with both theoretical foundation and practical ability. Looking ahead, regional teacher training colleges and universities should continue to strengthen cooperation with all parties, constantly innovate the education mode and content, and lay a solid foundation for the sustainable development of the senior undergraduate program in applied chemistry.

References

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