Journal of Education and Practice
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.15, No.10, 2024

Investigation of Talent Training Models in Fine Chemical Engineering from the Perspective of Industry-Education Integration

Binbin Qian*, Huiling Liu, Xinran Wang, Xiaoju Wen, Zongtang Liu, Zhenghao Fei
School of Chemistry and Environmental Engineering, Yancheng Teachers University
Yancheng 224007, China
E-mail: qianbb@yctu.edu.cn

Abstract

With the fast development of fine chemical engineering and the iterative upgrading of related fields such as technology, materials, and applications, the disconnection of the talent training concepts in some universities from the industry is becoming larger, which cannot meet the needs of industrial transformation, upgrading, and sustainable development. To narrow the gap between the quality of talent cultivation in universities and the requirement for industrial development, it is thus proposed to apply the theory of "integration of industry and education" to closely link teaching with enterprises and scientific research and optimize teaching content with the times. Therefore, the high-quality applied talents with solid theoretical knowledge can be cultivated, who will have innovative ability and practical ability. Finally, this will have certain guiding significance for universities to promote the integration of education chain and industry chain and cultivate talents together.

Keywords: Integration of production and education, Fine Chemical engineering, Talent Training Model

DOI: 10.7176/JEP/15-10-08
Publication date: September 30th 2024

1. Significance of integration of industry and education in cultivating talents in fine chemical industry.

In order to bridge the gap between talent cultivation in universities and practical demand from the industry, the integration model of industry and education is applied to closely integrate industry and education resources, which will help to achieve the goal of collaborating with enterprises to jointly build, cultivate talents, and make teaching content more closely aligned with practical needs. Universities cultivate high-quality talents, provide scientific research resources and technological reserves for enterprises and combine enterprise establishment practices and innovation and entrepreneurship platforms. Afterwards, both universities and enterprises jointly carry out technological research and innovation, accelerate the successful transformation and industrialization of scientific and technological achievements, and promote industrial development [1]. This cooperation can not only assist enterprises to improve their innovation capabilities and technological level, but also better respond to market competition, enhance core competitiveness of industries, and facilitate industrial upgrading. In short, the integration of industry and education is an effective model for achieving a two-side situation that is beneficial to both education and industry. It plays a positive role in improving education quality, optimizing industrial structure, enhancing industrial competitiveness, increasing employment rates, and promoting economic development. In response to the development of fine chemical industry, through the integration of industry and education professional education, we aim to strengthen students' understanding of the latest developments and trends with the path and direction of industrial upgrading, enhance their awareness and understanding of innovation, and provide high-level professional talents in research and development, technology, and management for the fine chemical industry chain. We will promote the integration and innovation of new generation fine chemical technology and equipment, and then accelerate the sustainable development of this field.

2. Analysis of talent training issues in fine chemical industry

2.1 Disconnection of teaching concept from society.

The transformation and upgrading of the fine chemical industry make it difficult for universities to accurately cultivate talents who are able to master cutting-edge production technologies, possess basic theoretical knowledge, and integrate knowledge and action. So talent cultivation cannot adapt to the rapid development and transformation of society. At present, the teaching system in universities is in a relatively closed "self circulation"

state, and some universities have the problem of talent cultivation emphasizing theory over practice, scientific research over teaching, and knowledge absorption over thinking creation. For some university teachers, although they have high academic qualifications and complete theoretical knowledge of the subject, lack in-depth understanding of the current status of the development of industry and the production, research and development, and application of products, which is due to a lack of experience in enterprise production. In terms of undergraduate training, they only focus on basic course construction and theoretical knowledge teaching, which makes them rooted in imparting knowledge through textbooks, resulting in poor understanding in the new trends of professional development, lacking practical experience, and neglecting the cultivation of basic professional qualities, psychological adaptability, and comprehensive qualities for students, which finally leads to the disconnection from the social development [2].

2.2 Lack of effective integration for industry and education.

The integrated teaching model of industry and education has not truly formed, the construction of talent platforms for university-enterprise co-education is not well established, the development lacks depth and breadth, and the application of research and innovation practice and achievement transformation is insufficient, all of which have led to the lack of substantial breakthroughs in vocational and technical quality education with practical and innovative abilities [3]. Due to the lack of a reasonable and comprehensive evaluation system for university-enterprise cooperation and teacher-student assessment, it is difficult to objectively and effectively evaluate students' overall abilities, scientific research literacy, and innovative thinking activities. It is also not integrated into the concept of university-enterprise joint training of professional talents, which cannot fully meet the requirements of the new era and environment. As a result, students are limited to absorbing professional theoretical basic knowledge, and their practical abilities and divergent innovative thinkings are not fully exercised, leading to a narrow range of knowledge and a single ability structure for undergraduate graduates. And thus, this makes it difficult to meet the demand for "theory application" composite talents in their positions.

3. Exploration and practice of talent training model for fine chemical engineering

There are two main factors that can promote the effective transformation of the fine chemical engineering from "profession" to "industry". The first one is to cultivate excellent talents through curriculum teaching, which is primarily conducted in universities. And the other is to achieve the goal of improving productivity through technological transformation, which is largely performed in enterprises. In this sense, the following points are necessary to be considered for the exploration and practice of talent training model.

3.1 Curriculum is the base.

Curriculum is the entry point of "science, industry, and education", and it is very important to do a good job in curriculum construction. Universities and enterprises should integrate their own advantages and resources to build a scientifically reasonable connection. For example, based on the latest development and needs of fine chemical engineering, professional courses are supposed to be adjusted and updated, and courses of new fine chemical processes and equipment should be added to help students to fully understand fine chemical engineering and cultivate professional skills. To be specific, it can be achieved through building diverse practical teaching platforms and introducing more practical teaching activities, such as experimental classes, field investigations, and project practice. Via the teaching platform, students can truly understand the structure, characteristics, and working process of the entire fine chemical industry chain. Through the testing platform and related testing equipment, they can conduct chemical performance testing, principal research, and carry out targeted experimental exploration [4].

3.2 Communication is the key.

Enterprises should strengthen the two-way flow of skilled talents. In order to improve the communications, the enterprises can dispatch excellent technical personnel from the perspective of industrial structure and development, then participate in the formulation of talent training plans, student management, and practical teaching work. As a result, they are able to organize and assist universities in building fine chemical engineering training bases and achieve the integration of theory and practice into practice.

3.3 Cooperation is the core.

Universities and enterprises can jointly carry out research and innovation in technology. Both parties will discuss the topic together and determine the focus and direction of cooperation based on the development needs of the fine chemical chain. As for the universities, they can provide advanced laboratory resources to enterprises, and through cooperation with enterprises, cultivate more high-level technical talents while transforming research

results into practical productivity. While for the enterprises, they can take the industrial advantages and practical experiences to adjust those technical talents from universities and make them adapt to the rapid development of the fine chemical industry chains.

3.4 Concept is the power.

The concept integration of ideological and political content in fine chemical industry. Teaching the ideological and political content of the first chapter introduction of the course "Fine Chemical Process and Equipment" well plays an important role in effectively carrying out the teaching of this course [5]. In the introduction class, emphasis should be placed on stimulating students' enthusiasm and initiative for learning this course, explaining the importance of fine chemicals and fine chemicals in the chemical industry, and presenting students with vivid examples closely related to fine chemicals in daily life. Therefore, students will have a deep impression and curiosity about fine chemicals. Currently, developed countries around the world prioritize the development of fine chemicals in the chemical industry. Here in China, we have also included the development of fine chemicals in multiple national development plans. Fine chemical products (or fine chemicals) are closely related to our daily life, including clothing, food, housing, and transportation. They have the characteristics of low investment, intensive technology, high added value, large profits, and a wide variety of products, making them a strategy for developed countries to expand their economic benefits [6]. For example, food additives and preservatives are commonly used in daily life, surfactants in washing products, anti-cancer drugs in medicine, skincare products in cosmetics, coatings used in buildings/cars/ships, adhesives and insulation materials are frequently used in aviation and aircraft, pesticides in agricultural production, etc. By explaining specific examples and watching fine chemical industry videos, students can gain a preliminary understanding of fine chemical industry and the contents and fields involved in this course. This will clarify the relationship between this course and national development, social development, people's needs, as well as students' own career development. It will motivate students to study this course hard, master theoretical knowledge and corresponding practical abilities such as the characteristics and preparation processes of fine chemicals and lay a solid foundation for future work in the fine chemical industry, finally contributing to China's socialist modernization construction and the great rejuvenation of the Chinese nation.

4. Conclusion

Based on the talent demand for fine chemical engineering and the concept of integrating science and education with industry and education, universities and enterprises should jointly cultivate "theory application" composite professional and technical talents. Both sides are supposed to fully utilize their respective advantages, integrate resources, equipment, etc., build a diversified comprehensive practical teaching platform, and achieve a win-win situation. With integrating the two basic activities of teaching and research within universities, the advantages of the university's own student resources and conditions can be fully taken, and hence the teaching content, and exercise students' innovative and practical abilities can be optimized and improved. Under the innovation driven development strategy, the integration of industry and education should not be simply limited to university-enterprise cooperation, but should further develop the depth and breadth of this cooperation. At last, mutual embedding and collaborative cooperation between higher education reform and fine chemical transformation and upgrading will be achieved.

Acknowledgements

The authors gratefully acknowledge the support from the Yancheng Key Research and Development Program (Social Development, YCBE202244), the Project of Education and Teaching Reform from Yancheng Teachers University (2023YCTCJGZ07) and the start-up grant (204060037) from Yancheng Teachers University.

References

[1] J. Liu, H. Liao, S. Lai, J. Xie, X. Liu. Research on Innovation and Entrepreneurship Education of Fine Chemical Specialty Under the Background of New Engineering. Chemical Teaching, 2022, 48(10): 124-126.

[2] Y. Zhao. Problems and Countermeasures of Vocational Education Talents Cultivation in the Perspective of Integration of Industry and Education. 2024, 5: 156-159.

[3] C. Li, X. Yu, X. Zhang, H. Liao, Y. Tan, H. Liu. Exploration and Practice of the Training Model for Fine

Chemical Engineering under the View of Modern Apprenticeship. Anhui Chemical Industry, 49(5): 195-198.

[4] G. Xu, Y. Zuo. Exploration of the Course of Reaction Processes and Equipment for Fine Chemicals. Shandong Chemical Industry, 2018, 47:146-147.

[5] C. Wang, X. Jiang. Curriculum System Design of the Fine Chemical Engineering for Applied Chemistry Professionals in New Economy Era. Chinese Journal of Chemical Education, 2020, 41(12): 13-17.

[6] P. Qian. Teaching Exploration and Practice on Fine Chemical Engineering Course under New Engineering Background. Guangzhou Chemical Industry, 2022, 50(15), 234-236