

Research on the Path of Integrating Innovation and Entrepreneurship Education into the Curriculum Ideology and Politics of Refrigeration and Air Conditioning Major in Colleges and Universities

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Abstract: In the background of reform of higher education in the new era, how to organically integrate innovation and entrepreneurship education with curriculum ideology and politics has become a key proposition for deepening the reform of education and teaching. As an important branch in the field of engineering, the refrigeration and air conditioning major not only undertakes the professional mission of cultivating technical talents in the industry, but also shoulders the era responsibility of implementing the fundamental task of cultivating morality and talents. Combining with the characteristics of the refrigeration and air conditioning major, this paper systematically analyzes the internal logic and practical significance of the integration of innovation and entrepreneurship education and curriculum ideology and politics, and explores its implementation paths in aspects such as the excavation of curriculum content, the innovation of teaching methods, the construction of practical platforms and the optimization of evaluation systems. It aims to provide practical reference and theoretical support for promoting the collaborative education of professional education and ideological and political education.

Keywords: Innovation and entrepreneurship education; Curriculum ideology and politics; Refrigeration and air conditioning; Education reform

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1. Introduction

In the background of the in-depth implementation of the “mass entrepreneurship and innovation” strategy and the connotative development of higher education, how to organically integrate innovation and entrepreneurship education with curriculum ideology and politics has become an important proposition in the reform of professional teaching in colleges and universities. As an important part of energy and power majors, the teaching content of the refrigeration and air conditioning major is highly consistent with the national key strategies such as green development, energy conservation and emission reduction, and cold chain logistics. In the current context of “double carbon” and the increasing improvement of the engineering education certification system, the effective integration

of innovation and entrepreneurship education with curriculum ideology and politics is not only conducive to improving students' professional ability and comprehensive quality, but also an important path to implement the fundamental task of cultivating morality and talents and promote the modernization of engineering education.

2. The important value of innovation and entrepreneurship education in the ideological and political education of refrigeration and air conditioning major courses in colleges and universities

2.1. Responding to national strategic needs and implementing the fundamental task of moral education and talent cultivation

The integration of innovation and entrepreneurship education into the ideological and political education of refrigeration and air conditioning major courses in colleges and universities is a vivid practice of responding to national strategic needs and implementing the fundamental task of moral education and talent cultivation. From the perspective of national strategy, this integration directly aligns with the policy orientation of “mass entrepreneurship and innovation”. At present, China's economy is in a critical period of transformation and upgrading, with the weakening of traditional growth drivers, and there is an urgent need to stimulate market vitality through innovation driven development. As an important branch of the industrial field, the talent cultivation of the refrigeration and air conditioning major must serve this overall situation. Through practical links such as simulating enterprise operations and incubating entrepreneurial projects, innovation and entrepreneurship education enables students to face industry pain points directly, such as energy efficiency optimization and cold chain logistics technology upgrading, and cultivates their innovative awareness in solving practical problems. For example, a university team developed an “air conditioning system based on waste heat recovery”, which not only reduces energy consumption but also improves user experience, and it is a typical case of innovation and entrepreneurship education serving the “double carbon” goal. This kind of innovation and entrepreneurship based on specialty not only promotes technological iteration but also helps adjust the economic structure, injecting new impetus into high quality development ^[1].

From the perspective of moral education and talent cultivation, the integration of innovation and entrepreneurship education and ideological and political education in courses realizes the unity of knowledge imparting and value guidance. The refrigeration and air conditioning major courses contain rich ideological and political elements. For example, the refrigerant substitution technology under the background of the Montreal Protocol involves both thermodynamics principles and ecological responsibilities. Through project-based learning, innovation and entrepreneurship education guides students to integrate the concept of “lucid waters and lush mountains are invaluable assets” into technical schemes. For instance, in the cold storage design project, students need to take both energy conservation and food safety into account, and in this process, values such as craftsmanship spirit and social responsibility are naturally embedded. At the same time, the analysis of failure cases in innovation and entrepreneurship competitions has also become an important carrier of frustration education, helping students establish a correct understanding that “innovation requires accumulating profound knowledge and experience”. This integrated education model makes professional education go beyond skill training and become a key path to shape students' feelings for their country and family as well as professional ethics ^[2].

2.2. Breaking through the boundaries of professional education and innovating talent cultivation models

The integration of innovation and entrepreneurship education into the ideological and political education of refrigeration and air conditioning major courses in colleges and universities has achieved a deep unity of

knowledge imparting and value guidance by breaking through the boundaries of professional education and innovating talent cultivation models. At the level of professional education, innovation and entrepreneurship education breaks the single dimension of traditional technical skill training and integrates ideological and political elements into professional courses. For example, through the “three in one and three style” teaching reform, in the refrigeration and air conditioning automation course, teachers, combining the selection principles of temperature and humidity detection instruments, point out the policy concept of energy conservation and emission reduction, and guide students to understand the connection between technological innovation and national strategy. This model not only imparts professional knowledge but also promotes ideological and political goals such as professional responsibility and the concept of green development with the cultivation of professional skills, extending the boundary of professional education from technical operation to value guidance ^[3].

In terms of talent cultivation models, innovation and entrepreneurship education has built a three-dimensional education ecology of “integration of specialty and innovation”. Taking Huangshan University as an example, its “three classroom linkage” mechanism runs through the whole process of talent cultivation with innovation and entrepreneurship education: the first classroom implants innovative thinking through project based teaching, such as guiding students to participate in the optimal design of refrigeration systems; the second classroom leads students into enterprises to solve practical problems under the tutorial system; the third classroom realizes the leap from theory to practice through industry training ^[4].

Finally, the synergistic effect of innovation and entrepreneurship education and ideological and political education in courses is also reflected in the value reconstruction of discipline culture. By exploring innovative cases in the history of refrigeration technology development, such as the research and development process of China’s first piston type refrigeration compressor, the course combines technological breakthroughs with the spirit of scientists and craftsmen, making professional education carry the feelings of family and country and the sense of mission. This integration not only breaks through the technical rationality limitation of professional education but also, through the practice platform under the guidance of embodied cognition theory, enables students to form the dual support of “technical confidence” and “cultural confidence” in solving real problems, cultivating high quality technical talents with both innovative spirit and social responsibility for the refrigeration and air conditioning industry ^[5].

2.3. Strengthening professional sense of mission and shaping industry responsibility awareness

In the ideological and political education of refrigeration and air conditioning major courses in colleges and universities, the integration of innovation and entrepreneurship education has irreplaceable value in strengthening the professional sense of mission and shaping the industry responsibility awareness. Through simulating real industry scenarios and introducing actual enterprise problems, innovation and entrepreneurship education enables students to deeply realize the direct impact of the refrigeration and air conditioning industry on energy efficiency, environmental protection, and social sustainable development in the process of solving technical problems. For example, the “green refrigeration technology research and development” project is integrated into the curriculum design, requiring students to not only optimize system energy efficiency but also consider environmental protection refrigerant substitution schemes. This practice-oriented learning method makes students intuitively feel the close connection between technological innovation and industry social responsibility ^[6].

At the same time, team collaboration and project management training in innovation and entrepreneurship education cultivate students’ collective sense of honor and industry belonging. When students’ complete tasks such as “intelligent cold chain logistics system design” in groups, they not only achieve breakthroughs at the technical level but also realize the significance of personal contributions to industry progress in cooperation,

thus internalizing the professional mission of “technology serving society”^[7].

In addition, by inviting industry leaders to share their innovation and entrepreneurship experiences, especially their practical cases in energy conservation and emission reduction as well as technology popularization, students’ sense of industry responsibility can be further stimulated, making them realize that professional choice is not only related to personal development but also bears the historical responsibility of promoting the green transformation of the industry and serving the country’s “double carbon” strategy. The in-depth integration of innovation and entrepreneurship education and ideological and political education in courses makes the professional sense of mission and industry responsibility awareness become the internal driving force for students’ professional growth^[8].

3. Effective paths for integrating innovation and entrepreneurship education into ideological and political education in refrigeration and air conditioning courses in colleges and universities

3.1. Deeply explore ideological and political, innovation and entrepreneurship elements in course content

In terms of exploring course content, we can start from all aspects of professional knowledge and skillfully integrate elements of innovation and entrepreneurship as well as ideological and political education. When explaining the principles of refrigeration systems, we can introduce the story of Chinese research teams overcoming the core technical difficulties of large-scale centrifugal chillers. We can tell how they broke the foreign technological monopoly and filled the domestic gap through continuous innovation. This not only demonstrates the spirit of innovation but also stimulates students’ sense of national pride and patriotism. When introducing air conditioning system design, combined with the current “dual carbon” goal, we can analyze innovative design cases of green and energy saving air conditioning systems. This guides students to think about how professional technology can help achieve sustainable development and cultivates their sense of social responsibility and environmental awareness^[9].

In the course content related to core components such as compressors and heat exchangers, we can take examples of enterprises in the industry improving product performance and reducing energy consumption through technological innovation. This allows students to understand the role of innovation in promoting industrial development. At the same time, we can integrate the craftsman spirit of striving for excellence to guide students to establish correct professional values. In addition, we can intersperse the development history of the industry in the course content, telling the struggle stories of the older generation of refrigeration and air conditioning experts who laid the foundation for the industry, so as to inherit the spirit of hard work. In this way, students can naturally accept innovation and entrepreneurship education and ideological and political education in the process of learning professional knowledge, realizing the organic unity of knowledge imparting, ability training and value shaping^[10].

3.2. Innovate teaching methods to promote in depth learning and value identification

In innovating teaching methods, we can combine multiple modes such as project-based teaching, case teaching and flipped classroom to promote the in-depth integration of innovation and entrepreneurship thinking and ideological and political education. In project-based teaching, focusing on practical problems in the refrigeration and air conditioning field, such as designing energy saving commercial building air conditioning systems and optimizing cold chain logistics refrigeration schemes, and let students carry out project research in groups. In the process of scheme conception, technical selection and team cooperation, students’ awareness of active

exploration and innovation is stimulated; in the result report link, students are guided to think about the significance of the project to energy conservation and emission reduction as well as people's livelihood security, so as to strengthen their sense of social responsibility ^[11].

For case teaching, we can select typical cases in the industry, such as China's independently developed ultra-low temperature refrigeration technology supporting aerospace projects and enterprises realizing transformation and upgrading by virtue of air conditioning intelligent control technology innovation. Organize students can be done to analyze the innovation points and ideological and political values in the cases, and learn the family and country feelings as well as professional dedication of scientific researchers and entrepreneurs. In flipped classroom, students can learn materials such as industry innovation policies and excellent enterprise innovation culture in advance. In class, debates and discussions can be carried out around topics such as "how the refrigeration and air conditioning industry practices the concept of green development". Teachers can guide appropriately, and while exercising students' critical thinking and expression ability, naturally integrate ideological and political elements into the discussion, imperceptibly shaping students' values and career ideals, so as to realize the same frequency resonance of knowledge transmission and value guidance ^[12].

3.3. Build a diversified practice platform to expand students' cognitive dimensions

In building practice platforms, it is necessary to integrate internal and external resources of the university, construct a multi-level and all-round practice system, and deepen the effectiveness of innovation and entrepreneurship education as well as ideological and political education. On campus, we can build an innovation and entrepreneurship laboratory for refrigeration and air conditioning majors, equipped with intelligent simulation systems and new refrigeration equipment, to support students in carrying out practical projects such as innovative design of small refrigeration devices and simulation of energy saving transformation of air conditioning systems ^[13].

In the process of experiments, students are encouraged to innovate boldly and try to break through the limitations of traditional technologies. At the same time, they are guided to pay attention to the impact of the projects on the environment and society, so as to strengthen the concept of green development and sense of social responsibility. Off campus, we need to build internship and training bases with leading enterprises and scientific research institutes in the industry, and organize students to participate in actual enterprise projects, such as the debugging of refrigeration systems in cold chain logistics centers and the operation and maintenance of air conditioning in large public buildings. Under the joint guidance of enterprise tutors and professional teachers, students can not only learn advanced production technologies and management experience, but also personally feel the innovative culture and craftsman spirit of enterprises, so as to cultivate professional dedication and professional ethics. In addition, we should actively hold innovation and entrepreneurship competitions and industry skill competitions, encourage students to participate in teams, improve their innovation ability and team cooperation ability in practice, and at the same time, guide students to pay attention to social needs through project topics in competitions, such as "design of distributed refrigeration schemes under the background of rural revitalization", so as to combine personal development with national strategies and realize the in-depth integration of innovation and entrepreneurship practice and ideological and political education ^[14].

3.4. Construct a scientific and diversified evaluation system to promote students' all round development

In constructing the evaluation system, it is necessary to break through the limitations of traditional assessment

and establish a diversified and dynamic evaluation model to effectively strengthen the orientation of innovation and entrepreneurship education and ideological and political education. We should abandon the way of evaluating students solely based on theoretical examination results, and incorporate innovative thinking, entrepreneurial practice ability and ideological and political literacy into the assessment indicators. In the assessment of professional courses, we should increase the proportion of practical links such as project design and innovation scheme defense, focus on students' ability to put forward innovative solutions and their application and exploration of cutting edge technologies, so as to measure the effectiveness of innovation and entrepreneurship education; at the same time, in team cooperation tasks, we should investigate students' communication ability and sense of responsibility, and in project result reports, evaluate students' cognition and practice of ideological and political contents such as technical ethics and social responsibility^[15].

In addition, we should introduce a process-oriented evaluation mechanism, track the growth trajectory of students in the learning process by means of classroom performance records, practical log analysis and phased achievement display. Teachers should communicate with students regularly, feedback the evaluation results, help them clarify their advantages and disadvantages, and adjust their learning direction in time. Besides, we can invite enterprise experts and industry practitioners to participate in the evaluation, and put forward opinions on students' innovation feasibility and professional quality from the perspective of industrial demand, so as to make the evaluation more in line with reality.

Through a scientific and comprehensive evaluation system, we can encourage students to actively participate in innovation and entrepreneurship activities, improve their ideological and moral cultivation, realize the comprehensive development of knowledge, ability and value, and promote the achievement of the collaborative education goal of innovation and entrepreneurship education and curriculum based ideological and political education.

4. Conclusion

To sum up, the integration of innovation and entrepreneurship education with curriculum-based ideological and political education in the refrigeration and air-conditioning major in colleges and universities is an important measure to implement national strategies and achieve the goal of fostering virtue through education. By excavating curriculum content, innovating teaching methods, building practical platforms, and constructing a scientific evaluation system, the unification of professional knowledge imparting, innovative ability training, and value shaping can be realized. This can not only cultivate talents with both technological innovation and social responsibility in the refrigeration and air-conditioning field, promote the green upgrading of the industry, but also provide practical examples for the "integration of specialty and innovation" in engineering majors, helping young students integrate their personal values into national development and contribute in building a strong nation.

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