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Research on Innovation and Entrepreneurship Education of Materials Major Students Based on OBE-CDIO

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Abstract

Based on the concept of OBE-CDIO, we will build an innovation and entrepreneurship practice education system for college students majoring in materials. It is result-oriented, aiming at improving innovation ability, and taking practical projects as the carrier to guide students to learn in an active and practical way, transform professional knowledge through practice, organically integrate professional knowledge and innovation and entrepreneurship practice, establish a talent training path for the dual integration of innovation and entrepreneurship education and professional education, strengthen the cultivation of ability and the provision of platforms, focus on students' practical application ability, and cultivate innovative and entrepreneurial high-skilled talents with professional core capabilities.

Keywords

OBE-CDIO model; Materials major; Innovation and entrepreneurship education.

1. Introduction

Mass entrepreneurship and innovation are booming, and have gradually become important forces to promote the transformation of old and new kinetic energy, the transformation and upgrading of economic structures, and the reform and development of higher education. Professional education and innovation and entrepreneurship education are both integrated and two-wheel drive, which are the core requirements of talent training in the new era. Professional education is the foundation of innovation and entrepreneurship education. Without professional education background, innovation and entrepreneurship education will become rootless. Innovation and entrepreneurship education is an extension and expansion of professional education. Without the integration of innovation and entrepreneurship education, professional education will lack vitality. In fact, professional education can reach the academic frontiers and understand the needs of society through innovation and entrepreneurship education.

However, the current innovation and entrepreneurship education is not closely integrated with professional education, there are many problem are prominent, such as disconnected from professional practice, shortage of practice platform, and single teaching methods. In the face of the new round of global technological revolution and industrial change, the training of material professionals must take the demand for innovative and entrepreneurial talents for economic transformation and upgrading as an opportunity, focus on the whole process of talent training, explore the new concept, new mode and new system of innovative education based on the deep integration of professional education and innovation and entrepreneurship education, and continuously improve students' professional innovation and entrepreneurial ability to support the service of new technology, new industry and the development of new technologies.

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2. The Integration of OBE-CDIO and Innovation and Entrepreneurship Education for Students Majoring in Materials

OBE (Outcome-based Education), also known as competency-based education, goal-oriented education, demand-oriented education or learning output-oriented education, has become the mainstream concept of higher education in developed countries such as the United States, the United Kingdom and Canada. The CDIO (Conceiving-Designing-Implementing-Operating) concept is a new engineering education model proposed by MIT and other universities in the United States, whose core is to take practical projects as the carrier, guide students to learn by doing, and achieve the mastery of professional knowledge and practical skills with "project-driven" teaching methods.

OBE education concept is based on both learning objectives and learning outcomes. It can be applied to the cultivation of college students' innovation and entrepreneurship ability, which can transfer the social demands and market needs to the innovation and entrepreneurship education of colleges and universities, and realize the precise teaching of every aspect of college innovation and entrepreneurship education, which is conducive to the systematic cultivation of college students' innovation spirit, innovation thinking and innovation skills. The core of the CDIO teaching concept is to take practical projects as the carrier, take practical education as the leading role, guide students to conduct active exploration learning in practice, and organically integrate the cultivation of knowledge, ability and quality, so as to achieve the improvement of professional knowledge, practical skills, team communication and collaboration ability and systematic problem-solving ability. OBE education philosophy and CDIO teaching philosophy complement each other. OBE gives the training objectives and training standards, answering the question of "what kind of people to train"; CDIO answers the question of "how to train people". CDIO focuses on practical teaching, which can correctly realize the OBE concept and talent cultivation goals, and is especially suitable for the cultivation of innovative and entrepreneurial high-quality talents with professional core competencies.

In this paper, the OBE concept oriented to learning outcomes and the CDIO concept oriented to projects are applied to guide the construction of the innovation and entrepreneurship practice education system under the dual-certification training model, emphasizing the student-centered approach and aiming to cultivate students with professional knowledge of innovation and entrepreneurship, i.e., they should have practical experience in independently undertaking and solving more complex project research and design, the spirit of innovation and entrepreneurship, critical thinking skills, problem-solving and decision-making skills, team skills, as well as the ability to adapt and lifelong learning. it can be used as a guide to design the practical education system, rely on vocational qualification training, introduce project-based teaching, and establish a diversified assessment system to evaluate the practical process and learning outcomes according to the teaching objectives, so as to form a practical education system based on the OBE-CDIO concept, realize the transformation from single discipline education to goal-based education, and focus on cultivating students' sustainable development ability.

3. The Practical Path of Innovation and Entrepreneurship Education for Material Students under OBE-CDIO Model

3.1. Improve the Construction of Faculty and Enhance the Ability of Teachers in Innovation and Entrepreneurship Education

Innovation and entrepreneurship education in colleges and universities should be carried out around the actual needs of students and society, and the core of the work of cultivating the innovation and entrepreneurship ability of college students is to have a faculty with the ability

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to highly integrate professional ability and innovation and entrepreneurship ability. On the one hand, colleges and universities should do a good job in training teachers' innovation and entrepreneurship knowledge and skills, and at the same time encourage teachers to "go out", actively carry out industry-university-research cooperation with enterprises, participate in the R&D work of enterprises, and go deep into enterprises to accumulate practical experience in innovation and entrepreneurship education. On the other hand, universities should explore the "introduction" of innovation and entrepreneurship teachers, invite excellent entrepreneurs and excellent technical experts to be guest teachers and innovation and entrepreneurship instructors, use their rich practical experience to guide college students to train their innovation and entrepreneurship ability. The program is designed to guide students to train their professional skills with result-oriented guidance and to guide them to complete innovation and entrepreneurship training projects, etc. This paper focuses on the practical exploration of the "dual mentorship" system inside and outside the university, i.e., employing entrepreneurs and senior technical experts in the field of materials as mentors outside the university, so as to cultivate a team of innovative and entrepreneurial teachers with professional background in materials, consisting of theoretical and practical teachers, full-time teachers and part-time teachers.

3.2. Build A Vocational Qualification Training Model to Guarantee the Quality of Practical Education

Under the OBE-CDIO model, the construction of vocational qualification training mode can realize the close integration of theoretical education with actual production and innovation and entrepreneurship requirements, and the innovation and entrepreneurship's practical teaching system established can be divided into three links:

(1) The classroom training is mainly based on theoretical teaching sessions, including the learning of professional knowledge theory and innovation and entrepreneurship theory. Theory is an important guide for practice, and having professional theoretical knowledge can help college students make scientific and reasonable judgment on the development status and trend of professional field, and mastering innovation and entrepreneurship theory is helpful to form a systematic and clear understanding of innovation and entrepreneurship.

(2) The vocational qualification training is mainly based on practical teaching, including professional skills practice and innovation and entrepreneurship practice. In this paper, we mainly focus on the need of improving the vocational ability of the students in materials majors and set up a comprehensive and design-oriented project practice session, and guide students to realize the whole process of conception-design-implementation-operation, so as to realize the integration of professional knowledge and innovation and entrepreneurship skills through the "project-driven" way.

(3) Comprehensive quality exercise in the practical link of innovation and entrepreneurship competition. Based on the completion of practical teaching training, outstanding practical projects will be selected to participate in innovation and entrepreneurship competitions, such as the "Internet+" Innovation and Entrepreneurship Competition for Chinese university students, the China University Material Heat Treatment Innovation and Entrepreneurship Competition, and the China University Material Heat Treatment Knowledge and Innovation Competition.

3.3. Oriented by Learning Results, Establish A Diversified Evaluation System

The practical link assessment should consider students' process performance, report writing, teamwork ability and overall quality performance, and establish a diversified evaluation assessment system. According to the defined training objectives of the course and the multi-level progressive practical teaching method, focus on examining students' basic design ability,

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comprehensive design ability and innovative design ability, focus on assessing students' knowledge growth and improving design practice application and innovation ability guide students to establish a more independent and active learning attitude, explore flexible, open and non-standard answer assessment methods, guide students to establish a more independent and active learning attitude. At the same time, in the process of tracking the effect of practical teaching, the evaluation results as well as the improvement opinions are given to realize the continuous improvement of the cultivation goal and give full play to the role of guidance, evaluation and motivation of evaluation assessment in the process of practical teaching.

4. Conclusion

The innovation and entrepreneurship practice education system under the OBE-CDIO model constructed in this paper is goal-oriented, designing the practical aspects of vocational qualification training, using project-based teaching throughout the training and teaching process, building a multi-level progressive practical teaching model, and gradually cultivating students' various practical abilities. At the same time, taking the project as the driver and the competition as the platform to guide students to realize the whole process of conception-design-realization-operation is conducive to promoting the overall improvement of students' comprehensive quality, realizing the close integration of professional education and innovation and entrepreneurship education, and realizing the effective connection between university innovation and entrepreneurship education from educational objectives, teaching methods and practical links with enterprise technological innovation. This model provides a theoretical basis and practical method for higher education institutions to establish a complete innovation and entrepreneurship education mechanism, which is conducive to improving students' innovative and entrepreneurial thinking and enhancing their core competitiveness in employment and entrepreneurship.

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