

Research on the Way to Improve the Ability of Innovative Talents in Industrial Design Against the Background of "Mass Entrepreneurship and Innovation"*

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Abstract—Against the background of "mass entrepreneurship and innovation", it has become the consensus of universities and society to train innovative entrepreneurs in industrial design. The discipline of industrial design has obvious characteristics. It integrates interdisciplinary knowledge and focuses on cultivating students' creative thinking and practical ability. By means of discipline competition, scientific research project, studio and "Internet plus", it can break closed teaching, promote the organic integration of design practice and social needs, and improve students' comprehensive innovation ability.

Keywords—*industrial design; mass entrepreneurship and innovation; studio; innovative talents; visualization; capacity enhancement*

I. INTRODUCTION

In the 21st century, influenced by the changes of educational environment and the external factors such as economic and social development, the specialty direction is gradually refined, and the demand for talent quality is constantly improving. China's manufacturing industry is facing the upgrading, and the cost and scale advantages of enterprises are fading. In this process, design ability and independent R&D become the key factors to determine the development of enterprises.

Against the background of "mass entrepreneurship and innovation", the international actively implements innovation-driven development strategy. Industrial design is not limited to appearance, but involves the full-scale development of functions. It has the commercial value of cooperating with and comparable to manufacturing industry, and is the most potential value-added link in the value chain of manufacturing industry. Industrial design plays an important role in the transformation and upgrading of manufacturing industry. It provides a large number of talents for independent innovation and brand building of enterprises,

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and provides feasible methods for product development. With the integration of Internet and intellectualization in product design, the society has put forward new requirements for the quality of industrial design professionals. As a talent training college, it should keep pace with the times and improve the quality of talent training.

II. THE CHARACTERISTICS AND ABILITY REQUIREMENTS OF INDUSTRIAL DESIGN DISCIPLINE

Industrial design is not only an innovative mode, but also an undergraduate specialty specified by the Ministry of Education. Industrial design specialty is an interdisciplinary subject which integrates engineering and art deeply. It is a specialty with strong practical application. It involves knowledge of mechanical structure, technology, art aesthetics, ergonomics, psychology, and economics and so on. Industrial design specialty is a specialty that emphasizes both creative thinking and practical ability, so as to realize the application of subject knowledge in the shaping and improvement of industrial products. The core of industrial design is product innovation, improvement and optimization. It gradually transits from product appearance creativity to comprehensive, intensive and systematic application innovation. It emphasizes that industrial development and upgrading can be driven by innovative design and promotion of services, and products are more pleasant, so as to enhance brand value and product added value. It integrates cross-border knowledge elements such as science and technology, culture and art, and social economy, and is an innovative way to create goods and services that meet users' needs.

Driven by the "mass entrepreneurship and innovation" policy, the relationship among design and expression, manufacturing, production, management, technology and structure is becoming closer and closer. Design is not an aerial conception, but a production on the ground. The goal and skills of personnel training should be closely related to the needs of social development, rather than based on textbooks set by teachers.

Application-oriented talents in industrial design need to apply professional knowledge and skills to social practice,

integrate professional knowledge with specific work skillfully and organically, take ability training as the core, take industry-university-research integration as the carrier, and have innovative spirit and practical ability.

College students of industrial design need the ability to develop the whole case, not just to draw pictures. They need keen insight, ability to analyze and research, ability to express pictures, ability to cooperate with other disciplines, and ability to optimize products comprehensively, so as to improve the success rate of commercialization of products.

III. EXPLORING THE WAY TO IMPROVE THE ABILITY OF INNOVATIVE TALENTS IN INDUSTRIAL DESIGN

Applied innovative talents in industrial design should be based on regional characteristics, serve enterprises, keep pace with the general direction of national policy, keep pace with the times, strengthen the linkage between students and social needs, improve students' professional quality and social adaptability, and meet the quality requirements of enterprises for talents. Students majoring in industrial design should choose more detailed product areas according to their hobbies. In the lower grades, they should learn a wide range of basic knowledge and skills, while in the higher grades. They should realize their focus and proficiency in a certain field. In the process of training, they should be nurtured and trained with different degrees of innovation and entrepreneurship, so as to help them form active innovative ideas. And then, it will gradually realize the connection between knowledge and social application, and cultivate their innovation and entrepreneurship awareness and practical ability, which pave the way for their future entry into society. In order to promote the students' professional ability, the following suggestions are made in the course training:

A. Classroom Teaching Based on OBE Concept

The core of OBE is outcome-based education, which tests the achievement of teaching with ability-oriented, goal-oriented and demand-oriented. The training goal of industrial design specialty is to train applied innovative talents who meet the social needs, have the ability of innovative thinking, graphic expression, comprehensive analysis and optimization, and can be competent for the work requirements of industrial product innovative design and development. This outcome-based education concept requires that the design practice in teaching must be a design innovation that solves practical problems and can transform aerial conception into commercial production. Therefore, in classroom teaching, it should implement the outcome-based concept, and combine the actual needs of society with professional knowledge, so that the goal of design practice is to solve practical problems as a starting point, to simulate innovative research in the real environment, to improve students' practical ability, and to enhance students' employment skills.

B. Designing Competition to Assist Instruction

Driven by discipline competition, students' enthusiasm is fully mobilized. The industry trends and product

development trends are obtained through designing competition, and students' knowledge application is tested by learning, training and competition, so as to promote the students' innovative ability and the transformation of achievements. With the recognition of the role of industrial design industry, the government and enterprises hold a large number of industrial design competitions every year, which provides a lot of training opportunities for students majoring in industrial design.

Schools should encourage and guide students to participate in design competitions. By replacing competition with training and assisting the teaching of courses, schools should promote the renewal of students' knowledge concepts and the cultivation of "visualization" ability of innovative thinking, so as to realize a virtuous circle of learning, training and competition. Industrial design specialty gathers knowledge characteristics of many disciplines, and has external subjective influence on the evaluation of the quality. The quality of products can't be self-centered, but should adapt to the customer-centered evaluation mechanism. Through the design competition, students can not only exercise their hands-on ability, but also understand the most cutting-edge evaluation standards, the most popular design elements, the functional needs of customers, and design works may also be "commercialized" for production, as well as obtain honorary certificates and material awards. The most important thing is that students can take into account strengths and weaknesses and improve knowledge application ability through participating in the complete process of innovative design.

C. Project-oriented Design Practice

With the curriculum as the carrier, in the main courses related to product improvement and development design, scientific research projects are introduced in a planned way to make teaching more targeted and students' design practice more grounded. By completing a series of product development and design processes of problem conceptualization, concept visualization and visual commercialization, product innovation design under complex real environment is realized, and students' practical training ability of professional knowledge is improved. The practical link of curriculum design is not to write a report or to draw a picture, but to solve practical problems, integrate product structure, shape, color and function, and realize the comprehensive optimization of products based on the problem orientation. It not only requires students to make innovation actively, but also needs students to have the ability to express innovative ideas. It also needs to improve the feasibility and create products to meet the needs of enterprises and customers.

Relying on scientific research projects for curriculum design, students can abandon self-centered and preconceived innovative ways. Instead of randomly choosing products they are familiar with to design, they should take project requirements as the theme to improve the design of certain categories of products to meet the needs of certain groups. From the market research, creative thinking, graphical expression, program optimization, model making and other

processes, students can not only cultivate their sense of independent innovation, but also improve their comprehensive thinking ability and teamwork ability, and enhance their sense of participation and achievement. With scientific research projects as the means and actual product development as the blueprint, this method can test the teaching effect, promote the practical application ability of students' knowledge, and improve the authenticity of students' innovative design.

D. Promoting Students' Ability to Develop the Whole Case by Commercializing Design

Design innovation is not a simple process of graphic expression, but a complex and systematic process of product innovation and optimization, involving all stages from product positioning to product commercialization. Divergent topics are easy to breed students' preferences of seeking benefits and avoiding disadvantages. They will choose familiar and easy-to-use design, but after entering the enterprise, design innovation is oriented theme. Therefore, the course teaching should try to plan the subject design practice of orientation, inculcate students' ability to actively complete the established tasks, coordinate the layout and rationally arrange the time. Students can accumulate experience and acquire the most objective knowledge and comprehensive professional skills of their major by completing market research, statistical analysis, problem discovery, teamwork, stimulating creativity, expressing ideas in graphical language, screening schemes, structural optimization, material analysis, man-machine optimization, making models, making design reports and drawing engineering drawings.

E. Implementing "Internet +" Thinking and Promoting Transformation of Design Outcomes

Industrial design is one of the innovative ways to realize the visualization and commercialization of design concept. In the process of formulating tasks, market research, creative expression, scheme optimization, virtual model making, man-machine optimization and production, the most important step is to produce products on the ground and commercialize the design concept.

In the process of accepting the design plan, enterprises should not only consider the product's pleasure, but also consider the factors such as market, sales, brand, and cost and so on. They will not easily invest in the development of new products. It is impossible for products to enter the market without prior investment, and the Internet has given us a new way. In the supply-side reform, the state has put forward the combination of crowd innovation, crowdfunding, crowd sourcing and so on, which has an epoch-making role in promoting the development of industrial design industry. Through the internet, information technology can be shared. Through crowd innovation, crowd funding, crowdsourcing and other means, the company can improve the product technical scheme and raise funds, timely optimize the scheme according to customer feedback information, and finally realize product transformation and production. This mode of Internet + design has revolutionized the traditional

innovation methods, subverting the pattern of completely relying on enterprise investment before. It can complete the landing production of products by means of crowd funding, and enhance the possibility of success in business.

For example, making cultural and creative products into physical objects and realizing the sale of products through micro-stores realize the transformation from innovation to entrepreneurship, greatly promoting the enthusiasm of students. For products with high technology content, it will rely on maker space to realize technology sharing, integrate advanced technology, structural appearance, material engineering and so on, and realize product transformation and production. If the enterprise is unwilling to make the investment, it can raise funds through the crowd-funding mode and return the investment after the product commercialization.

This mode of "Internet + design" has greatly improved the way of entrepreneurship for industrial design students. It has also changed the innovative ways and employment concepts of traditional design talents, so that people from different fields can integrate together through the Internet to achieve the commercialized production of products.

F. Classification Guidance Based on Studio Model, and Giving Full Play to Their Strengths

Graduates majoring in industrial design are employed in a wide range of industries, such as digital household appliances, furniture manufacturing, transportation tools, information services, interactive design, daily necessities, cultural tourism products and other industries. The industries have different emphasis. Combining with the teaching and training plan, the design studios in different product areas should be constructed in the direction of professional training, and the support of regional characteristics and industrial projects should be adhered to. Students should be encouraged to choose appropriate specialty subdivision directions according to their interests and hobbies, so as to realize the vertical deepening of professional knowledge and improve their design innovation ability in a certain field. It achieves teaching, scientific research, business docking through the studio, so that innovative design and development will be down to earth. Students should participate in more design practice under the guidance of teachers, and exercise their professional application ability in corresponding fields.

Studio can be used as a supplement to extracurricular teaching activities, so that students can get professional skills through this window.

In the studio, it can simulate the working environment of enterprises, take project research and practical tasks as the carrier, train students' ability to think, analyze and solve problems, and promote students' team cooperation ability, research innovation ability, knowledge application and hands-on ability by participating in the whole project development and design process.

G. Other Ways

In addition to the above innovation and entrepreneurship education based on discipline characteristics, there are also innovation and entrepreneurship thematic education and professional practice which are advocated by colleges and universities. General education of innovation and entrepreneurship can inspire students' innovative consciousness, cultivate students' psychological literacy, conditions and methods of knowledge reserve, and professional practice has been paid attention to by colleges and universities. This article will not repeat it. Innovation and entrepreneurship education in China is quality education. It is an educational paradigm that integrates knowledge, specialty and innovation and entrepreneurship. Innovative and creative education of industrial design specialty can't be separated from professional knowledge education, and it is not an extracurricular activity promoted by school administrators alone. It should be established on the basis of professional knowledge and form a micro-innovation and entrepreneurship education system with professional characteristics.

IV. CONCLUSION

The major of industrial design should be encouraged by the national macro-policy to construct an innovative talent training system for practical purposes, to adapt to the development trend of today's design industry and the demand for talents, and to promote students' ability to apply knowledge through various ways. Colleges and universities should make students get professional training from the perspective of vocational talents, and find a feasible way to cultivate students' comprehensive vocational quality and ability. Through the implementation of competition, project teaching, workshops, Internet + and other methods, the application of professional knowledge and social needs, and the transformation of results and practical capability are aimed at training modern talents who meet the requirements of enterprise employment and have a strong sense of independent innovation and entrepreneurship.

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