

Teaching Reform and Innovation Exploration of Graduate Students of Industrial Design Engineering Based on the Background of Industrial 4.0

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Abstract: With the advent of industrial 4.0 era, the teaching of industrial design engineering graduate students is also changing. Firstly, the influence of industrial 4.0 on industrial design is briefly analyzed, and then the problems related to teaching reform and innovation of graduate students of industrial design engineering are discussed. Research shows that in the industrial 4.0 era, industrial design has realized the transformation and upgrading of China's manufacturing industry by promoting enterprise product upgrading, technology upgrading, industrial structure upgrading, and functional upgrading. It also played a certain role in the reform and innovation of industrial engineering graduate teaching.

1. Introduction

The national "Twelfth Five-Year Plan" clearly pointed out that it is necessary to "accelerate the development of industrial design and promote the transformation of industrial design from design to high-end integrated design services" [1]. This indicates that China's industrial design industry will enter a historical leap period, not only to achieve scale expansion and quality improvement, but also to create a good environment for the industrialization of industrial design in China [2]. The economic development is accompanied by fierce competition. The prosperity of China's industrial design education has also made the industrial design industry face a cruel survival of the fittest [3]. The competition in industrial design education lies in whether the industrial design talents cultivated meet the social needs [4][5][6]. With the increasingly fierce competition in the market, the important role of industrial design in strengthening the competitiveness of enterprises is becoming more and more prominent. Now it has been regarded as a symbol of market competition in the era of knowledge economy and a major concern for the national economy and people's livelihood [7]. Over the years, with the further development of Internet of Things, mobile computing, big data, artificial intelligence and other information technologies, with the new energy, new materials and new process changes [8]. With the integration of information technology and the physical world closer, the global industry is undergoing a major and fundamental change, which is called Industry 4.0 in Germany [9].

2. Methodology

As soon as the concept of "industrial 4.0" was put forward, it has aroused great repercussions, concerns and even recognition in the global scope, because "industrial 4.0" is of great significance to the transformation and upgrading of manufacturing industry [10]. With the advent of industrial 4.0, on the one hand, there is a huge market demand for professional high-level talents, especially professional degree graduates; on the other hand, it will inevitably put forward higher requirements for their quality. In the meantime, the Ministry of Education requires colleges and universities to implement innovative and entrepreneurship training programs for college students in order to improve their innovative and entrepreneurial practical abilities. Therefore, this paper puts forward the corresponding reform and Exploration on the teaching mode of industrial design specialty. In order to be able to compete in an invincible position, so that China's industrial design can occupy a place in the world, industrial design education has been exploring the teaching reform. The

emphasis and favor of the society on industrial design has greatly promoted the development of industrial design education. At present, China's industrial sector has caught up with the wave of informationization without completing industrialization. For the transformation and upgrading of China's manufacturing industry, pressure and momentum coexist. Inspired by this, the Chinese government timely proposed the Chinese version of the "Industry 4.0 Plan" - "Made in China 2025", and its core content is to emphasize the deep integration of "industrialization" and "informatization", and build a smart factory for information interaction. And intelligent production.

The characteristics and development of the industrial design profession have been closely watched by many universities in China. In order to adapt to this change, it is necessary for the training institutions such as universities and research institutes to adjust the current professional degree graduate training model in order to comprehensively improve the overall quality of graduate students. At present, how to innovate the postgraduate training model is a realistic problem that every training unit urgently needs to solve. In some products, even China's independent intellectual property rights, but the core design is still purchased from abroad, which is very common in high-tech industries such as automobiles, machinery and computers. Another feature of Industrial 4.0 is the extension of manufacturing process and manufacturing value to use process. It not only pays attention to making a product, but also pays attention to how to make good use of the product to maximize the value of the product. As a key producer service industry, it is of great significance to study how to promote the transformation and upgrading of manufacturing industry through industrial design for China's manufacturing industry in the confusion of transformation and upgrading. Some developing countries are also accelerating their planning and layout, actively participating in global industrial redistribution, undertaking industrial and capital transfer, and expanding international market space.

3. Result Analysis and Discussion

Intelligent factories and intelligent production in the era of "Industry 4.0" can produce products with "Intelligent" characteristics, and can implement intelligent industrial design according to the corresponding needs. Industrial design, as the application of new technology, new material, new technology and new energy, has undergone tremendous changes in its use context and tools under the background of industrial 4.0. The key difference between industrial design and other designs lies in the solid material design. Even in the different stages of design, its unique creativity can not directly show the actual shape of the product by only two-dimensional design performance, and can not correctly test the relationship between the actual volume and material. It is necessary to continuously test and modify the design scheme with the help of various three-dimensional models, which is also a huge challenge for the course. In the current context, the quality of the design is no longer determined by the decision makers of the enterprise, but is determined directly by the market, as long as the design can be recognized by some people. Then the design can achieve landing, which greatly improves the design tolerance and fault tolerance, and solves many of the strict restrictions in design execution.

The informatization characteristics of industrial design are reflected in three aspects: First, information tools for design tools and means. The second is the informationization and dataization of design tasks. The third is the interaction between design communication and information feedback. For a long time, industrial design has not had a special government management department in China, and industry associations are basically in a loose state, and the source of funds is seriously insufficient. Industrial design is low in industrialization and industrial design talent is scarce. On the one hand, there is a shortage of talents in the whole design market. On the other hand, it is difficult for students majoring in design to distribute. Many of them change to other jobs, which reflects the contradiction between the supply and demand of talents. Industrial designers are no longer just product designers. We need new ways of thinking and attitudes to face our work areas. In the new era, the boundaries of various industries will begin to blur, and a kind of invisible cross-border will be formed between all walks of life. Industrial designers will also become a multi-disciplinary and multi-disciplinary intellectuals.

4. Conclusions

Industry 4.0 is called "Made in China 2025" in China, that is, it takes about 10 years for China to upgrade its manufacturing industry. Industry 4.0 is both a challenge and an opportunity for China's manufacturing industry. How to accelerate the integration of informatization and industrialization through industrial design and promote the transformation and upgrading of manufacturing industry is a problem worthy of joint consideration by the government and enterprises. At present, the subject and specialty settings in Colleges and universities have gradually changed from the highly differentiated situation to the present situation of cross-comprehensive development. Especially in the independent colleges oriented by applied talents, the formation and development of cross-disciplinary professions have gradually received attention from all walks of life. In this process, industrial design in the context of Industry 4.0 will play a crucial role. Industrial design as a new type of applied and cross-type discipline, the improvement of its education system needs further exploration. In short, teaching reform is a continuous and dynamic process. In this process, we must continuously collect and organize information, which can only be perfected through continuous supplementation through future teaching practices.

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