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Innovation of Industry-Education Integration Talent Cultivation for Product Design Major under New Liberal Arts Context: A Case Study at Liuzhou Institute of Technology

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Abstract: *Based on the background of new liberal arts construction, this paper addresses the talent cultivation needs of product design majors in applied universities. By synthesizing relevant research findings and taking the product design major at Liuzhou Institute of Technology as a typical case, this study systematically explores innovative pathways and practical strategies for industry-education integration talent cultivation models. Through analyzing the current status of talent cultivation and combining the demands of Liuzhou's home appliance manufacturing industry and automotive peripherals industry, the research proposes innovative approaches and elaborates on the practical experiences of Liuzhou Institute of Technology's product design major in constructing distinctive interdisciplinary curriculum systems and establishing industry-oriented practical teaching mechanisms. The research demonstrates that this model significantly enhances students' comprehensive literacy and practical innovation capabilities in the field of product design, achieving favorable results in talent cultivation for product design majors in applied universities.*

Keywords: *New Liberal Arts; Product Design; Industry-Education Integration; Talent Cultivation Model*

1. Introduction

In the current era when the new liberal arts construction wave is sweeping through higher education, industry-education integration has become the core driving force for promoting professional development and talent cultivation reform. As an applied discipline that interfaces with industrial needs, the product design major is facing a critical transition from traditional theoretical teaching models to industry-oriented practical talent cultivation models. Related research indicates that curriculum system updates and cultivation model reconstruction driven by innovation are key to enhancing professional competitiveness, and the construction of interdisciplinary curriculum systems based on industrial needs is crucial for cultivating talents that meet market demands[1]. The product design major at Liuzhou Institute of Technology, combining the development needs of local home appliance manufacturing and automotive peripherals industries in Liuzhou, actively explores industry-education integration talent cultivation models. By integrating multi-dimensional elements such as industrial resources, educational resources, and technological resources, it aims to cultivate applied design talents who possess design capabilities, technological applications, and industrial thinking, providing strong support for local industrial development and regional economic construction. This paper comprehensively employs literature research methods, case analysis methods, and empirical research methods to deeply analyze the practical experiences of the product design major at Liuzhou Institute of Technology.

2. Current Status of Talent Cultivation for Product Design Majors in Applied Universities

2.1 Lagging Curriculum Systems and Insufficient Industry Alignment

Currently, most applied universities' product design major curriculum systems still follow traditional art design education frameworks, with an excessive proportion of traditional design theory and modeling foundation courses, while content addressing industrial needs such as intelligent technology applications, industrial process cognition, and industrial culture research is insufficiently integrated. Research shows that industry-oriented talent cultivation models based on OBE concepts

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have not been effectively established, resulting in a disconnect between students' knowledge structures and industrial needs. The lack of organic connection between courses and industrial processes makes it difficult to form knowledge synergy effects that serve the industry. When dealing with actual product design projects, students are often limited in implementing creative ideas due to insufficient understanding of industrial technology or inaccurate grasp of market demands.

2.2 Weak Practical Teaching and Lack of University-Enterprise Collaboration

Practical teaching components suffer from formalization issues, with outdated laboratory equipment on campus and practice projects disconnected from real industrial scenarios, making it difficult for students to access the complete product design process[2]. Research on local applied universities shows that university-enterprise cooperation mostly remains at superficial levels such as internship base establishment, while mechanisms for deep enterprise participation in talent cultivation plan formulation, curriculum design and practical guidance throughout the entire process have not been established. This situation results in students' insufficient practical abilities and innovative design capabilities that fail to meet actual enterprise needs[3].

2.3 Imbalanced Faculty Structure and Insufficient Industrial Practice Capabilities

The faculty team is primarily composed of theoretical design teachers, with a low proportion of teachers who have frontline industrial work experience, are familiar with intelligent manufacturing technologies, and master automotive peripherals industry design processes. Research has found that insufficient teacher industrial practice capabilities have become a key factor constraining talent cultivation quality under the industry-education integration context. Teachers find it difficult to effectively integrate cutting-edge industrial technologies and market dynamics with design education, and cannot effectively guide students in conducting design practices that meet industrial needs.

2.4 Vague Cultivation Objectives and Disconnection from Industrial Needs

Some universities' product design majors have vague talent cultivation objective positioning and fail to closely combine with local characteristic industrial needs. Research indicates that professional cultivation directions are not precisely aligned with regional industrial development needs, resulting in insufficient student employment competitiveness and structural contradictions between talent cultivation and industrial demands[4]. In Liuzhou, traditional product design talent cultivation models struggle to meet the needs of home appliance manufacturing and automotive peripherals industries for professional design talents who "understand design, technology and markets", and are even less capable of supporting industrial expansion needs that serve Guangxi and radiate nationwide.

3. Main Approaches for Innovative Practice of Industry-Education Integration Talent Cultivation

3.1 Constructing Distinctive Industry-Oriented Curriculum Systems to Promote Supply-Demand Integration

Breaking down disciplinary barriers, we construct an industry-oriented curriculum system that integrates "design + technology + industry + innovation" as a four-in-one approach centered on industrial needs[5]. Professional core courses incorporate technical course modules such as intelligent product development technology and industrial manufacturing processes, as well as industry course modules including automotive peripherals industry culture research and market-oriented development of automotive interior accessories[6]. For example, in the Product Innovation Design and Development course, teaching units related to home appliance manufacturing processes and in-vehicle product design are established, enabling students to systematically master knowledge systems that serve multi-level markets. Meanwhile, cutting-edge industry elective course clusters are offered, encouraging students to autonomously select courses based on local industrial characteristics and regional development needs, broadening industrial perspectives and constructing knowledge systems that adapt to diverse market demands. Furthermore, emphasis is placed on the complementary advantages of teaching and industry, promoting the integration of design education in applied universities with local industrial development models, forming interactions between teaching and industry, and integration of knowledge with practice, helping students construct knowledge systems that meet multi-level industrial needs to address challenges posed by design industry development on talent capabilities.

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3.2 Innovating Practical Teaching Models to Strengthen Industrial Practice Capabilities

A practical teaching system of "on-campus basic training + enterprise field training + industrial project practice" is constructed to conduct practical education. On-campus facilities are equipped with design software and basic training equipment synchronized with enterprises, providing students with practical skill training platforms. Industry-education integration bases are jointly established with university-enterprise cooperation partners including Liuzhou home appliance manufacturing enterprises and key industrial enterprises within Guangxi region, introducing authentic industrial projects to achieve "real problems with real solutions"[7]. For example, product iteration design projects are conducted in cooperation with local home appliance enterprises, where students complete the entire industrial practice process from market research and design proposals to prototype development under the joint guidance of enterprise designers and on-campus teachers, effectively enhancing practical innovation capabilities for serving multi-regional markets. Simultaneously, diverse industrial thinking collisions are encouraged, with students from different majors forming interdisciplinary teams in industry-education integration projects. Through authentic enterprise project-driven approaches, collisions between design thinking, engineering thinking, and market thinking are realized, stimulating industry-adaptive creativity. Design students absorb enterprise engineering standards and regional market logic in industry-education integration practice, rationally critique and optimize design proposals, enhancing design feasibility, technical viability and multi-market adaptability, making designs more industrially valuable and market competitive[8].

3.3 Building Dual-Qualified Faculty Teams to Enhance Teaching Standards

Integrating on-campus and off-campus faculty resources, dual-qualified mentor teams composed of full-time on-campus teachers, enterprise technical experts and industry specialists are established. Teachers are regularly organized to participate in practical training at local Liuzhou enterprises, industrial technology training within Guangxi region, and national industry academic exchange activities. Teachers are encouraged to jointly conduct horizontal research projects oriented toward multi-level markets with enterprises, enhancing teachers' teaching and research capabilities for serving regional industries. Through team collaboration, complementary advantages among teachers from different disciplines are realized, jointly conducting curriculum teaching and industrial project guidance. Breaking down university-enterprise resource barriers, university-enterprise collaborative teaching platforms based on industrial projects are established, enriching teachers' industrial teaching methods and providing multi-regional industrial empirical support for teaching. Design teachers, focusing on multi-level industrial needs, expand research directions, transitioning from theoretical teaching to industrial practice teaching, extending from local project research to regional project research, aligning with new liberal arts construction and industry-education integration development directions.

3.4 Aligning with Industrial Development Needs to Clarify Cultivation Objectives

Based on the characteristics of Liuzhou's home appliance manufacturing industry and automotive peripherals industry, professional talent cultivation objectives are precisely positioned. Guided by the home appliance manufacturing industry's demands for intelligent, green, and humanized product design, as well as the automotive peripherals industry's requirements for functional, safe and comfortable automotive component design, professional cultivation directions are clarified. Talent cultivation plans are jointly formulated with enterprises, and curriculum content is adjusted in a timely manner according to local Liuzhou industrial technology iterations, Guangxi regional development planning, and national industry trends, ensuring that talent cultivation specifications are closely aligned with multi-level industrial position requirements, delivering applied design talents who can "stay local, be useful, and expand capabilities" for local economic development, Guangxi industrial upgrading and national market expansion. Meanwhile, resources from both universities and enterprises are fully utilized to provide industrial-level experimental data support for teaching projects, meeting design education's needs for multi-regional industrial technology and market data, realizing local transformation and regional output of design achievements, and ensuring integrated implementation of industry-education integration.

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4. Specific Measures for Industry-Education Integration Talent Cultivation: A Case Study of Product Design Major at Liuzhou Institute of Technology

4.1 Constructing a Three-Dimensional Integrated Industry-Oriented Curriculum System

Guided by new liberal arts construction, the product design major at Liuzhou Institute of Technology has established a distinctive "three-dimensional integrated" curriculum system comprising foundational courses, professional core courses and industry expansion courses[9]. In the foundational course stage, technical courses such as product design drafting, three-dimensional digital design and design technology applications are offered to strengthen students' technical foundations and multi-level industrial culture knowledge. In the professional core course stage, content including structural design, intelligent control principles, and intelligent interaction is deeply integrated with product design core courses, with course modules related to home appliance manufacturing processes and automotive peripheral product design established. For example, in the Enterprise Project Design Training course, on-campus faculty and enterprise engineers jointly conduct classes, achieving collaborative teaching that combines design capabilities, technical applications and multi-level industrial cognition. In the industry expansion course stage, cutting-edge courses such as design management and service design are established to broaden students' industrial knowledge boundaries for serving multi-regional markets. Through curriculum system reform, students' industrial adaptability and innovative design capabilities in the product design field have been effectively enhanced.

4.2 Implementing Dual-Mentor System and 1+X Teaching Model

A dual-mentor system is implemented, providing students with both on-campus professional mentors and enterprise mentors. On-campus mentors are responsible for guiding students in professional knowledge and design methods, while enterprise mentors provide industrial practice guidance and career development advice based on enterprise position requirements, project practical experience and regional market characteristics[10]. Meanwhile, a 1+X teaching model is established. At the teacher level, design major faculty lead courses while integrating enterprise technical experts and industry specialists according to industrial knowledge needs, breaking the tradition of single-teacher instruction for one course. At the student level, course selection flexibility is opened, with design students and enterprise intern students forming 1+X learning combinations to conduct research on multi-level industrial practical problems, exploring industrial solutions based on different learning and practical experiences, reflecting industry-education integration development.

4.3 Innovating Teaching Methods by Integrating Industrial Thinking

In-depth research on industry-specific teaching methods is conducted, analyzing and summarizing project processes of local Liuzhou enterprises, enterprises within Guangxi region and national enterprises, organizing multi-level industrial technology standards and transforming them into teaching elements. Teaching methods addressing design education and multi-level industrial practice needs are deconstructed and integrated, with novel combinations formed for different teaching modules, creating distinctive industry-oriented teaching methods. By integrating industrial elements such as enterprise project management models and automotive peripheral manufacturing technology standards, traditional design discipline teaching concepts are transformed, improving teaching quality and students' adaptive effectiveness for serving multi-regional industries.

4.4 Committed to Building a Distinctive Industry-Education Integration Practice Platform

Efforts are devoted to jointly establishing a Product Design Industry-Education Integration Innovation Platform with enterprises. Currently, the platform is under preparation. The plan involves integrating resources from basic modeling training rooms, intelligent home appliance module laboratories, and home furnishing cultural and creative design module laboratories. This platform can introduce authentic product R&D projects from home appliance enterprises and component design projects from automotive peripheral enterprises. Students can utilize platform equipment to complete product appearance design, structural optimization, functional testing and prototype production, realizing complete industrial process practice from creativity to product, enhancing students' practical innovation capabilities and social service abilities.

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4.5 Establishing Long-term University-Enterprise Collaborative Education Mechanisms

Deep cooperative relationships are established with local Liuzhou home appliance manufacturing enterprises and automotive peripheral enterprises, with university-enterprise joint cultivation committees formed to jointly formulate talent cultivation plans, develop curriculum resources and construct practice bases[11]. Enterprises regularly dispatch engineers and designers to teach on campus, holding cutting-edge industry lectures and regional industrial technology training sessions. School faculty conduct technical services and product R&D within enterprises, achieving university-enterprise resource sharing and complementary advantages[12]. For the home appliance manufacturing industry, intelligent product joint R&D projects are conducted in cooperation with enterprises. For the automotive peripherals industry, joint automotive peripheral product innovation design is carried out with enterprises, developing automotive peripheral accessory products that meet market demands. Through university-enterprise collaborative education mechanisms, students can timely understand local Liuzhou industry dynamics, Guangxi industrial planning and national technology trends, while enterprises can select outstanding talents in advance, forming a positive interactive education pattern[13].

5. Practical Outcomes and Experience Summary

5.1 Significant Enhancement of Students' Industrial Adaptability

Through the implementation of the industry-education integration talent cultivation model[14], students in the product design major at Liuzhou Institute of Technology have achieved remarkable results in industrial innovative design capabilities and practical operational skills in the product design field. Over the past three years, students have won more than 30 awards in competitions such as the National College Students Industrial Design Competition, Milan Design Week, China Good Ideas and Future Designers. They have participated in over 10 projects including home appliance enterprise product design projects and automotive peripheral enterprise component design projects. The employment competitiveness of graduates has significantly improved, with employment rates maintaining above 90% for three consecutive years. Employment positions cover multiple fields including product designers and regional market design specialists, receiving widespread recognition from local Liuzhou enterprises and units within Guangxi region.

5.2 Dual Enhancement of Teaching, Research and Industrial Service Outcomes

The faculty team has achieved certain results in industry-oriented teaching and research. Despite having many new teachers, the team has secured 4 regional-level teaching reform projects, including 2 projects specifically serving Guangxi industrial upgrading, and published over 10 related academic papers. Faculty actively participate in industrial training and industry exchange activities, continuously working on teaching method innovation and industrial project R&D. With the accumulation of faculty industrial practice experience, more achievements serving local and regional industries are expected in the future[15].

5.3 Enhanced Social Service Capabilities

The university collaborates with enterprises in technology R&D and product innovation, providing strong support for local and regional industrial development[16]. For example, a compact washing machine developed in cooperation with home appliance enterprises has been selected for development by the enterprise, enhancing the market competitiveness of Liuzhou home appliance companies.

6. Conclusions and Prospects

Through in-depth research and practical analysis of the industry-education integration talent cultivation model for the product design major at Liuzhou Institute of Technology, this paper demonstrates the significant effectiveness of this model in enhancing talent cultivation quality, promoting professional development, and serving local and regional industries. By constructing distinctive industry-oriented curriculum systems, innovating industry-oriented practical teaching models, building dual-qualified faculty teams, and establishing university-enterprise collaborative education mechanisms, the problems existing in traditional talent cultivation have been effectively

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alleviated. Precise alignment between talent cultivation and multi-level industrial needs has been achieved, along with organic integration of teaching processes with production practices, cultivating applied design talents who adapt to the development needs of home appliance manufacturing and automotive peripheral industries under the new liberal arts context and can serve Guangxi while radiating nationwide.

In the future, the product design major at Liuzhou Institute of Technology will further deepen reforms in industry-education integration talent cultivation models, strengthen integration with new industrial technologies in the product design field, and explore new pathways for intelligent product design and lightweight design of in-vehicle products. The program will deeply explore the cultural connotations of the automotive peripherals industry and innovate automotive component design and development approaches by combining digital technologies. Continuous optimization of curriculum systems and teaching methods will be pursued, strengthening exchanges and cooperation between universities and enterprises, and introducing advanced educational concepts and teaching resources. The university-enterprise collaborative education mechanism will be further improved, expanding cooperation fields and depth in serving Liuzhou, Guangxi and national industries. Unremitting efforts will be made to cultivate high-quality design talents with industrial vision, innovative capabilities and social responsibility, continuously exploring innovative pathways for talent cultivation in product design majors at applied universities under the new liberal arts context.

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