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Research on the Cultivation of Composite Industrial Design Talents in Local Applied Undergraduate Colleges and Universities

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Abstract:
The cultivation of industrial design talents should arrive at the social kernel problems in the new era, and the research should shift from “discipline-oriented” to “problem-oriented” and “demand-oriented”, and take a cross and comprehensive perspective to examine the discipline orientation and talent cultivation objectives of industrial design in the new era. It examines the disciplinary positioning and talent cultivation objectives of industrial design in the new era, plans the high-quality development path of industrial design education in applied undergraduate colleges and universities from multiple perspectives such as co-creation of teachers and students, cultural leadership, digital intelligence empowerment, and multi-dimensional integration, etc., and combines the disciplinary foundation and characteristics of the institutions and the advantageous industrial resources of the local industry to build a modularized curriculum system of cross-disciplinary integration and a diversified innovative ecology of design talent cultivation, thus building a differentiated innovation paradigm for design disciplines in applied undergraduate colleges and universities，effectively enhance the composite vocational core quality of industrial design talents in local applied undergraduate colleges and universities as well as local service consciousness, so as to provide solid support for the sustainable development of regional economy and society.

Keywords: applied undergraduate university;industrial design;Cross-fertilization of disciplines;fusion of industry and education;Talent cultivation model.

Accompanied by the new millennium's technological change, social transformation and the profound change of the world pattern, the problems faced by the design work become more and more complex and globalized, and the solutions present cross-border and cross-trend [1], the traditional design education exists in the disconnection between theory and practice, the teaching mode is single, the curriculum content is obsolete, the lack of practical innovation ability cultivation [2], and it is difficult to meet the needs of the social and economic environment in terms of the output of talents.In 2022, the Ministry of Education moved “design ” into the category of “interdisciplinary studies” [3], which involves knowledge from different disciplines such as social humanities, aesthetics, information technology, artificial intelligence, and so on [4]. It has been pointed out that when universities build the design education system, they should coordinate the theories, concepts, research methods and interdisciplinary curricula of different disciplines from a holistic point of view [5],flexible and diversified education model, emphasizing the cultivation of independent thinking, grasping of frontiers, and cross-fertilization abilities [6].

In order to effectively improve the training quality of composite industrial design talents in local application-oriented undergraduate universities, this paper will combine the cutting-edge research on industrial design education and the construction experience of first-class design disciplines at home and abroad. Based on problems and needs, this paper will clarify the development orientation and direction of industrial design disciplines in local application-oriented undergraduate universities according to the existing foundation, characteristics and local advantageous resources， create differentiated design talent training goals and education models,and then systematically build the local applied undergraduate colleges and universities industrial design professional curriculum system and practice innovation ecology, effectively improve the independent integration and innovation ability of industrial design students, help the sustainable development

of the regional economic and social development, and provide empirical evidence basis and experience reference for other local universities and colleges in design education reform.

1. New Age Requirements for Talent Cultivation of Industrial Design Professionals

The purpose of industrial design education is to cultivate innovative talents with the ability to discover, analyze and solve problems to meet the needs of the times. Since entering the twenty-first century, new things, needs, scenes, technologies, tools, etc. have emerged continuously, making the problems faced by design workers present a multidisciplinary, comprehensive and diversified trend, while the rapid development of artificial intelligence technology has led to the creation of standardized, repetitive art design will be gradually replaced. Traditional design education is based on mechanized, scenario-bound mode, which lacks the cultivation of students' multi-dimensional ability, making them easy to rely on the scenario, and restricting the enhancement of vocational migratory ability and sustainable development ability. Therefore, in order to cope with the crises and challenges brought by technological changes, social transformation, industrial upgrading and changes in people's needs in the new era, industrial design professionals should have both theoretical knowledge, vocational skills, innovation ability, critical thinking, teamwork ability, etc., and should be able to grasp the new needs, adapt to the new objects, apply new technologies, construct new scenarios, open up new industries, and create a new model. It can be seen that under Industry 4.0, complex innovative design talents who can flexibly cope with complex situations and unknown challenges are the backbone of future social and economic development, which puts forward higher requirements for design education in universities, and the cultivation objectives, teaching contents, teaching mode and teaching methods should be updated and adjusted according to the needs of the times.

2. Development Strategy of Industrial Design Education in Local Applied Undergraduate Colleges and Universities in the Context of New Era

In recent years, famous institutions at home and abroad have successively put forward diversified design education models to cope with the changing needs of talents in the new era,for example, the RCA2022-2027 strategic plan of the Royal College of Art, Parsons School of Design interdisciplinary education model and "project-based learning" educational concept, and Politecnico di Milano will integrate design, technology and management disciplines,as well as the interdisciplinary innovation platform of the "Sino-Finnish Center of Tongji University", the "Great Aesthetic Education" concept of the Academy of Fine Arts of Tsinghua University and the interdisciplinary graduate program of "GID - Global Innovative Design".Famous colleges and universities at home and abroad provide us with a large number of results in the field of innovative design education model, which strongly support and inspire this study, but the cultivation of design talents should be developed in the direction of diversification, and local applied undergraduate colleges and universities can not blindly copy the advanced experience of the construction of design disciplines in first-class colleges and universities because of the different categories, levels of schooling, and sources of students.

At present, China's applied undergraduate colleges and universities have insufficient understanding and knowledge of the new era of change in design talent cultivation, and lack a comprehensive and systematic theoretical research framework and top-level design of discipline construction [7].Under the background of the new era, local applied undergraduate colleges and universities should explore the construction of design talent cultivation system and professional construction practice from the perspective of cross-disciplinary synthesis, and pay attention to the pattern of social and regional economic development when carrying out the reform of design education,build a modularized teaching system oriented to the needs of the industry and enterprises and taking the professional core competence as the logical starting point,at the same time, improve the quality assurance system of practical teaching, effectively enhance students' practical skills, innovation ability, comprehensive quality and vocational adaptability [8].

3. Exploration of Composite Industrial Design Talent Cultivation Mode in Local Applied Undergraduate Colleges in Zhejiang Province

The level of development of higher education is an important indicator of the country's development level and development potential. While domestic higher education is gradually transforming from elitism to

popularization, domestic colleges and universities are still dominated by academic education and present problems such as serious homogenization, difficulty in employment of graduates, and disconnection with the needs of economic development.As the main component of China's higher education, local applied undergraduate colleges and universities are also the main force of local scientific and technological innovation power, and play an important role in local economic development.Therefore, local applied undergraduate colleges and universities should change their development ideas, respond positively to the demands of local economic and social development, and explore the talent cultivation goals and innovative education models suitable for colleges and universities, students and local economic development.Next, we will take Zhejiang University of Finance & Economics Dongfang College as an example to explore the cultivation mode of composite industrial design talents in local applied undergraduate colleges in the context of the new era.

3.1 The foundation for the cultivation of composite industrial design talents

As an emerging applied specialty involving art, technology, market, psychology and other multidisciplinary contents, the industrial design profession establishes an effective applied talent training mode as its development direction.Local applied undergraduate colleges and universities should define their professional training objectives and talent cultivation modes according to the characteristics of the student source, combined with the advantageous disciplines of the university and the local characteristic industries [9].Zhejiang University of Finance & Economics Dongfang College is an applied undergraduate college featuring economics and management disciplines and the coordinated development of multiple disciplines, located at the junction of Hangzhou and Jiaxing (Haining), where there is a rich industrial base, an innovative entrepreneurial atmosphere and a strong demand for industrial design talents, which involves the industries of household electrical appliances, fashionable homes, health care, culture and tourism industry, Internet industry and so on.

The Industrial Design major of Zhejiang University of Finance & Economics Dongfang College is established on the basis of the Product design major founded in 2012.Professional teachers graduated from China Academy of Art, Jiangnan University, Hunan University and other famous design colleges and universities in China, all of them have more outstanding design practice experience and teaching level.The product design major of our university has formed a relatively perfect curriculum system after years of development, in which the product design training, thematic design, household goods design, furniture design, interaction design, intelligent product design and other courses are rich in teaching results and outstanding course characteristics, and has established a stable cooperative relationship with a number of well-known enterprises, such as the Bull Group, Martian Kitchen, Jiuyang Electrical Appliances, etc., which is a better performance in the integration of education and collaborative education.At the same time, the professional construction of machining laboratories, ceramics laboratories, 3D printing laboratories, laser engraving laboratories, VR equipment, 3D scanning equipment and other components of the creative workshop laboratory group, can fully meet the professional requirements of the various practical teaching.In summary, in the subsequent construction of the industrial design professional curriculum module should reflect the characteristics of the university's economic and management, combined with the existing professional foundation and characteristics, and benchmarked against the regional advantageous industries.

3.2 Interdisciplinary integration of personnel training and professional construction

Creative design has become more prominent in the national development strategy, and the demand for design talents continues to climb.However, Michaelis college employment report shows that art and design for four consecutive years by the yellow card warning, design professionals difficult to find employment, college personnel training and industry demand, job requirements misalignment.In order to enhance the job fitness of design talent training under Industry 4.0, the skill chain and knowledge chain of industrial design talent training will be sorted out according to the ability demand of the counterpart positions, so as to clarify the objectives of industrial design talent training in local applied undergraduate colleges and universities and the specific training program.By searching the latest job information of relevant enterprises and design companies on professional recruitment websites such as BOSE Direct Recruitment, Wisdomlink Recruitment and Hire, as well as public numbers such as Design Recruitment and Design Recruitment Gateway.Clarify the specific job

standards and job requirements for industrial design positions, analyze the main job tasks, analyze the specific job competency requirements and their generation rules, and split them into professional skill points and knowledge points, and integrate them into knowledge and skill modules on the basis of analyzing their intrinsic logic, and then build the curriculum modules by combining with the needs of the times and the advantageous resources of the local area, and assign the knowledge and skill modules to specific courses.

Industrial design connects innovation, technology, research, business and users, and therefore requires designers to have a growing capacity for cross-disciplinary integration.Based on the background of the times and market demand for industrial design talent training needs analysis, and then the industrial design discipline knowledge system combing,on this basis, the industrial design program of Oriental College of Zhejiang University of Finance and Economics has developed the connotation system construction of the design discipline with the core of “co-creation of teachers and students, cultural leadership, digital intelligence empowerment, and multi-dimensional integration”, and has continuously adjusted and improved the talent cultivation program and the modularized teaching plan.The industrial design knowledge system involves a lot of cross-cultural, technical, and commercial intersections and fusions. The overall framework of the industrial design curriculum system is to build a modular, clustered, and localized matrix professional course system based on the school's features, the existing foundation of the major, and the local advantage resources, in addition to the basic courses of industrial design-related foundations (basic theories, basic skills, and basic literacy), as shown in Figure 1,includes four major course modules for the Internet industry, new manufacturing industry, home life, and cultural and tourism industry.Such a curriculum module setting makes the training of talents to meet the needs of regional economic and social development, and comprehensively covers the cultivation of professional skills, innovative thinking, comprehensive quality and other composite vocational core qualities.

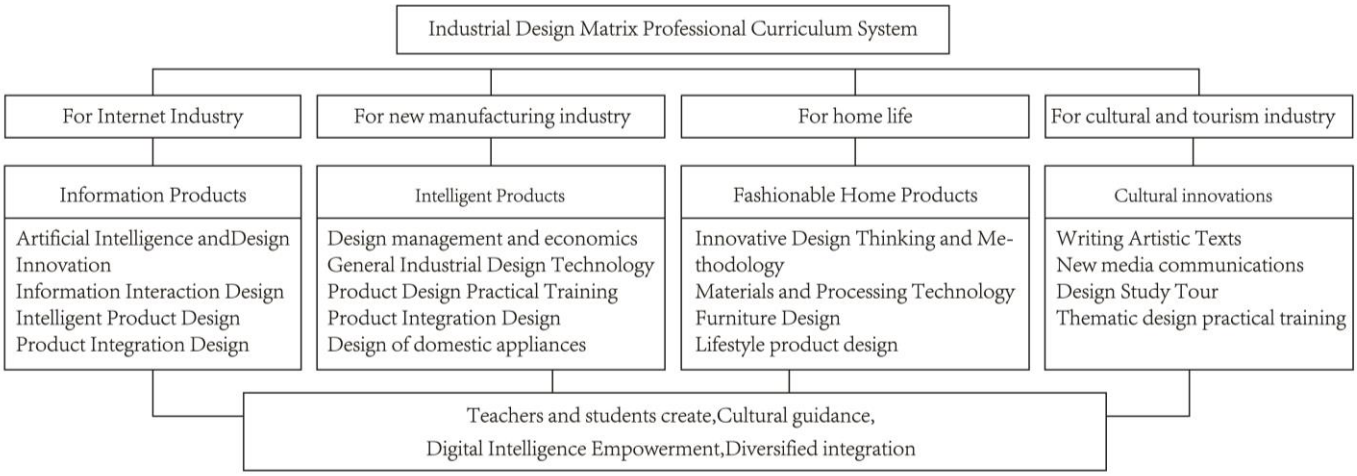

Figure 1: Curriculum of the Industrial Design Program

3.3 Constructing a diversified and integrated practice and innovation ecology

Innovation is the first driving force to lead high-quality development, and innovative and applied talents are indispensable in the process of China's progress towards a “smart manufacturing powerhouse”.At present, most enterprises and design institutions require industrial designers to have comprehensive skills such as creative planning, research and analysis, market positioning, brand marketing, styling design, organization and coordination, etc.The previous teaching concept of emphasizing theory and neglecting practice can no longer meet the requirements of modern industrial development for talents.Aiming at the homogenization of industrial design talent cultivation status quo, explore the differentiated development direction of design discipline practice teaching suitable for local applied undergraduate colleges and universities in Zhejiang Province, and construct a three-dimensional and multi-dimensional ecosystem of industrial design practice and innovation talent cultivation.

The industrial design program of Zhejiang University of Finance & Economics Dongfang College focuses on the oriented goal of cultivating composite industrial design talents to carry out the research on the mechanism of interdisciplinary cross-fertilization and industry-teaching synergistic cultivation.Through competitions and projects implanted into the classroom, social surveys, professional practice, comprehensive professional training, innovation and entrepreneurship projects and other practical teaching modes,and modes of industry-teaching integration such as enterprise internships, school-enterprise co-teaching, and school-enterprise joint projects,collaboration to build a practice and innovation ecology of industrial design specializing in “integration of industry and education, cross-discipline integration, and integration of theory and practice”.At the same time, we continue to promote the innovation of industry-teaching integration mode, improve the effectiveness and evaluation mechanism of practice teaching, and create a cooperative education mechanism with stable cooperation, in-depth content and diversified modes,guarantee the effectiveness of cooperation between education and industry, set up a reasonable structure and interdisciplinary school, industry and enterprise composite faculty, ensure the effectiveness of practical teaching of cross-fusion courses, comprehensively enhance the vocational core literacy and skills of industrial design talents, and promote the quality of applied talent training.

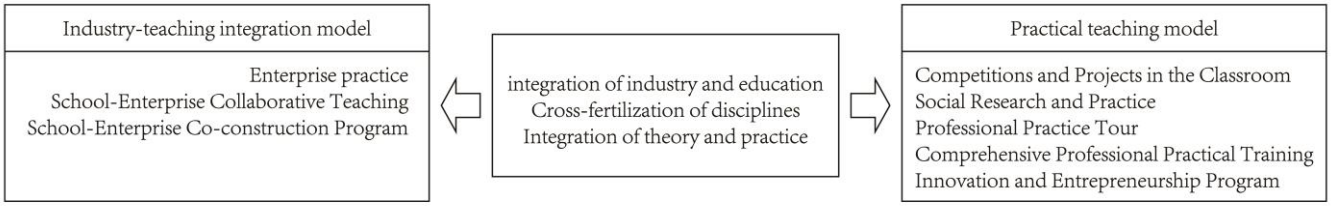

Figure 2: An Ecology of Practice and Innovation in the Industrial Design Program

3.4 Improve the guarantee system for the cultivation of composite industrial design talents

Local colleges and universities to cultivate knowledge, ability, quality are in line with the requirements of the composite industrial design talent, only focus on the internal quality of teaching is far from enough, the need to build the relevant talent training guarantee system.

3.4.1 Giving full play to the role of policy guidance and institutional regulation

Complex industrial design talent training cannot be separated from the support of the government and society, the government should increase policy-driven efforts, and pay attention to the coordination of colleges and universities, enterprises, schools, teachers and students, and other multi-party interests,guaranteeing the breadth, depth and strength of cooperation between education and industry, ensuring the effectiveness of practical teaching and the cultivation of practical application ability of talents.

3.4.2 Deepening Faculty Development through Internal Training and External Attractions

On the one hand, it promotes the updating of the knowledge and ability system of the existing teachers through education and training and the integration of “teaching, scientific research and social service”, and on the other hand, it encourages the teachers of industrial design majors to work with teachers of other disciplines, and the full-time teachers on campus and the industry experts from outside the university to build an interdisciplinary team of teachers who are both specialized and part-time.

3.4.3 Increase the construction of practice bases and internship training platforms

The construction of various types of practice bases and internship training platforms is an important part of practical teaching, an important hand for students to consolidate and exercise their interdisciplinary professional knowledge, and an essential channel for students to transform classroom content.Colleges and enterprises should form a good development mechanism for mutual promotion and benefit, and jointly build various practice bases and internship training platforms inside and outside the school, so that the training of talents is directly connected to the industry's needs and job requirements.

4. Conclusion

This topic centers on the construction and development of industrial design majors in local applied

undergraduate colleges in the context of the new era.On the basis of mastering the cutting-edge theories and advanced experiences in design education research, we follow the research idea of "sorting out the background of the selected topic→constructing the theoretical framework→analyzing the empirical cases→proposing countermeasures and suggestions→carrying out the practical argumentation" and gradually promote the research.And take Zhejiang University of Finance & Economics Dongfang College as an example, the research is carried out in the following aspects:

4.1 Taking the problems and demands of the new era as the entry point, combining the existing foundation and characteristics of the university as well as the local advantageous industries and cultural resources, we examine the talent cultivation of industrial design majors from the comprehensive perspective of cross-disciplinary integration.Taking "co-creation by teachers and students, cultural leadership, digital intelligence empowerment and diversified integration" as the core, building a differentiated innovation paradigm for industrial design talent cultivation in local applied undergraduate colleges and universities,to promote the connotative and high-quality development of design disciplines in local applied undergraduate colleges and universities under the new track.

4.2 Focusing on the top-level design of design education in local applied undergraduate colleges and universities, and clarifying the objectives of cultivating industrial design talents in the context of the new era,aiming at the forefront of science and technology and local advantageous resources, and completing the network design innovation knowledge system combing through the interdisciplinary integration,and then build a modular, clustered, local characteristics of the matrix professional curriculum system construction.

4.3 Constructing a Practice and Innovation Ecology of Industrial Design Specialization in Local Applied Undergraduate Colleges and Universities with "Integration of Industry and Education, Cross-discipline Integration, and Integration of Theory and Practice",creating a collaborative education mechanism with stable cooperation, in-depth content and diversified models,promote innovation in the mode of integration of industry and education, and guarantee the breadth, depth and strength of cooperation between education and industry.At the same time, we set up a reasonable structure and interdisciplinary university, industry and enterprise complex teaching team to ensure the effectiveness of practical teaching of cross-fusion courses.

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