

The Construction of a Product Art Design Professional Cluster in the Era of the Digital Creative Industry - A Case Study of Anhui Business Vocational College

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Abstract:

With the rapid development of digital technology, the digital creative industry has become an emerging force driving economic and social development, posing new requirements for traditional design fields and their talent cultivation models. Taking the Product Art Design major at Anhui Business Vocational College as an example, this paper explores how higher vocational colleges can construct professional clusters to integrate creative design and digital technology, thereby addressing the opportunities and challenges brought by industrial transformation in the era of the digital creative industry. The article analyzes the background and necessity of constructing professional clusters, elaborates on the specific practical paths and features of Anhui Business Vocational College in terms of talent cultivation models, curriculum systems, faculty teams, and practical teaching base construction. It also points out the problems encountered in practice and preliminary solutions, aiming to provide a reference for the professional construction and reform of similar institutions.

Keywords:

Digital Creative Industry, Product Art Design, Professional Cluster, Talent Cultivation Model, Integration of Industry and Education

1. Introduction

The deep integration of information technology and the cultural creative industry has given rise to the digital creative industry, an emerging economic form. The widespread application of new technologies such as big data, artificial intelligence, and virtual reality has not only changed the ways products are designed, produced, and consumed but also profoundly influenced the connotation and extension of design education. The traditional industrial design education system needs to adapt to the demands of the digital, networked, and intelligent era, shifting from a singular design thinking approach to cultivating comprehensive abilities that integrate creativity, technology, and business. The “13th Five-Year National Strategic Emerging Industry Development Plan” has included the digital creative industry in the national strategy,

indicating a huge demand for high-quality technical and skilled personnel in this field. Against this backdrop, higher vocational art and design education, especially the Product Art Design major, faces the pressing task of transformation and upgrading. [1]

How to effectively integrate creative design education with digital technology and cultivate new types of talent that meet the development needs of the digital creative industry is an important issue currently facing higher vocational education. Professional cluster construction, as an important way to integrate resources, optimize structures, and enhance the quality of talent cultivation, has become an effective strategy for higher vocational colleges to cope with industrial changes. Taking the construction practice of the Product Art Design professional cluster at Anhui Business Vocational College as an example, this paper aims to sort out its specific practices, characteristics, and challenges in constructing professional clusters against the background of the digital creative industry, summarize replicable experiences, and provide practical references and theoretical support for the digital transformation and professional cluster construction of art and design majors in higher vocational colleges.

2. Necessity and Challenges of Constructing a Product Art Design Professional Cluster in the Context of the Digital Creative Industry

The development of the digital creative industry requires design talent to possess not only a solid foundation in art and design but also digital technology application skills, cross-disciplinary collaboration abilities, and innovation and entrepreneurship capabilities. The knowledge system of a single major struggles to meet the demand for composite talent. Constructing a professional cluster can break down disciplinary barriers, achieve resource sharing and complementary advantages, and form a synergistic force in talent cultivation. By integrating Product Art Design with related majors such as Advertising Design, Digital Media, and Software Technology, a broader knowledge platform can be built, widening students' career development paths and better serving the talent needs of the digital creative industry chain. [2]

However, constructing a professional cluster is not easy and faces numerous challenges in practice:

- **Sustainability of the Industry-Education Integration Mechanism:** How to establish a stable, in-depth, and mutually beneficial long-term mechanism for school-enterprise cooperation, avoiding cooperation becoming a mere formality or one-sided enthusiasm.
- **Deep Integration of the Curriculum System:** Knowledge structures and curriculum systems of different professional backgrounds (such as art and information technology) vary significantly. How to effectively construct shared, core, and extended courses to achieve true integration rather than simple superposition.
- **Collaborative Operation of Teaching Organization:** How to break the traditional teaching mode based on majors and classes and implement cross-disciplinary, project-based teaching organization forms to meet the needs of project-based teaching.
- **Construction of a "Dual-Qualification" Faculty Team:** How to effectively enhance teachers' cross-disciplinary and practical abilities, introduce enterprise mentors, and build teaching teams capable of handling integrated teaching needs.

3. Exploration of the Product Art Design Professional Cluster Construction Practice at Anhui Business Vocational College

Anhui Business Vocational College, centered on the core concept of integrating “Creative Design + Digital Technology,” has systematically promoted the construction of the Product Art Design professional cluster from five dimensions: talent cultivation model, competency progression path, curriculum resource construction, faculty team building, and practical base construction.

3.1. Implementing the “School-Enterprise Dual Co-construction” Talent Cultivation Model: Deep Integration, Demand-Oriented

Traditional talent cultivation models often disconnect from industrial needs. To address this issue, the professional cluster focuses on constructing and practicing the “School-Enterprise Dual Co-construction” talent cultivation model, the core of which lies in deeply integrating real enterprise needs, projects, and environments into the entire talent cultivation process.

- **Co-construction Entities and Mechanisms:** Entities are diverse, involving the school (Product Art Design, Advertising Design, Digital Media, Software, Big Data, etc. majors), enterprises (such as D&D Innovation Group, Zhuoyu Manufacturing, industry associations, etc.), and the government (providing policy support and guidance). Mechanism guarantees include establishing a professional cluster construction steering committee, jointly formed by school and enterprise representatives, responsible for approving talent cultivation plans, curriculum standards, evaluation systems, etc. A regular communication and coordination mechanism is established, with joint meetings held periodically to address cooperation issues. In-depth cooperation agreements are signed, clarifying the rights and obligations of all parties.

- **Manifestation of “Duality” in the Cultivation Process:**

- Jointly Defined Cultivation Goals:** Conducting joint research on digital creative industry trends and regional enterprise job requirements to precisely position talent cultivation goals and specifications, clarifying the core competencies and knowledge structure graduates should possess.[3]

- Jointly Discussed Cultivation Plans:** School and enterprise jointly discuss, formulate, and revise talent cultivation plans to ensure they are forward-looking, adaptive, and operable. Enterprise employment standards, technical specifications, and project processes are integrated into the plans.

- Jointly Constructed Course Content:** Enterprises deeply participate in curriculum development, especially core professional courses and project training courses. New technologies, processes, specifications, and cases from enterprises are promptly introduced into the classroom. For example, developing training projects based on real product design processes in collaboration with D&D Innovation Group.

- Jointly Assembled Teaching Teams:** Forming “tripartite” teaching teams composed of school professional teachers, digital technology teachers, and enterprise engineers, designers, and project managers. Enterprise personnel are not just part-time teachers but also important participants in curriculum development, project guidance, and skill evaluation.

Jointly Managed Practice Process: Students rotate learning and practice between on-campus training bases and off-campus enterprise practice bases. Enterprises deeply participate in the management, guidance, and assessment of student internships. Implementing a “Modern Apprenticeship” pilot program, allowing students to “learn by doing and do while learning.”

Jointly Evaluated Cultivation Quality: Establishing a diversified evaluation system that not only assesses students’ theoretical knowledge and basic skills but also focuses on their problem-solving ability in real projects, teamwork skills, professional ethics, and innovation potential. Introducing enterprise evaluation standards, using indicators like the commercial conversion rate of project outcomes, user satisfaction, and enterprise recognition as important evaluation metrics.

• **Model Features and Advantages:**

Demand-Driven, Precise Cultivation: Talent cultivation is closely aligned with market and enterprise needs, effectively solving the “disconnection between learning and application” problem.

Resource Sharing, Complementary Advantages: The school provides basic theoretical teaching and general skills training, while enterprises provide real projects, cutting-edge technologies, and practical environments, optimizing the allocation of educational and industrial resources.

Industry-Education Integration, Synergistic Innovation: School-enterprise cooperation extends beyond talent cultivation to technical research and development, social services, cultural inheritance, etc., forming a virtuous cycle of interaction and mutual promotion.

Innovation and Entrepreneurship Integrated Throughout: Integrating innovation and entrepreneurship education concepts and practices throughout the talent cultivation process, encouraging students to transform learning outcomes into actual products or services, effectively enhancing employability and entrepreneurial potential.

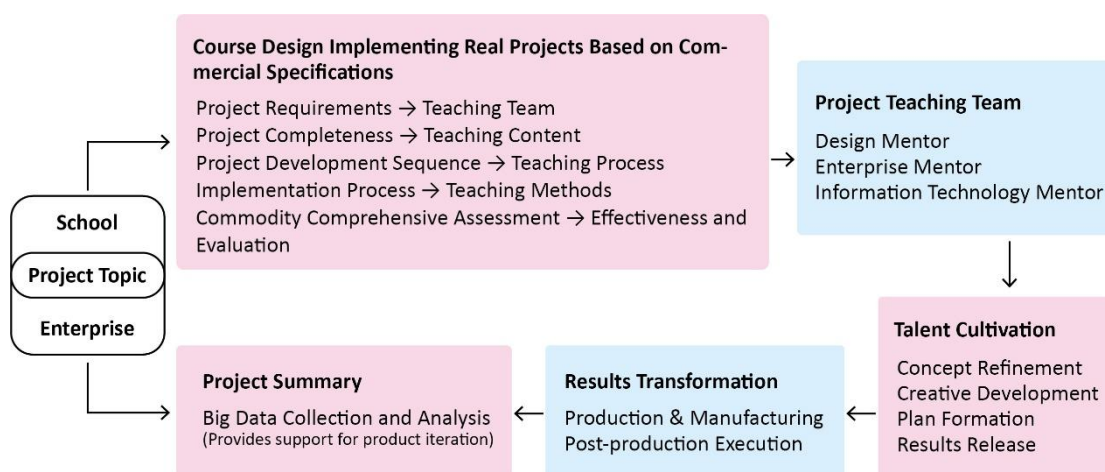


Figure 1. “School-Enterprise Dual Co-construction” Talent Cultivation Model for the Product Art Design Major.

3.2. Implementing the “Project-based Competency Progression” Talent Cultivation Path: Gradual Progression, Competency-Based

To ensure students systematically and effectively master the required knowledge and skills during their three years of study, the professional cluster designed a “Project-based Competency Progression” talent cultivation path, using projects as the primary vehicle for driving learning, integrating knowledge, and cultivating abilities.

- **Stage 1 (Semester 1): Professional Foundation Literacy and General Competency Cultivation.** Helping students understand the overview of the digital creative industry and the learning field of the professional cluster, stimulating learning interest, mastering necessary basic professional knowledge (e.g., design sketching, color composition, basic design software, introduction to digital technology), cultivating professional literacy (e.g., communication and collaboration, time management, information literacy), and foundational innovative thinking. Primarily based on shared platform courses of the professional cluster, supplemented by entrance education, career planning guidance, and basic experiential projects (e.g., design thinking workshops, simple digital tool application exercises).

- **Stage 2 (Semesters 2-5): Project-Driven Core Competency and Cross-disciplinary Integration Ability Cultivation.** Through a series of projects with increasing difficulty, complexity, and comprehensiveness, systematically cultivate students’ core professional skills (e.g., product form design, interaction design, UI design, advertising planning and design, digital media production), cross-disciplinary collaboration abilities, and complex problem-solving skills. Implementing “Multi-level Project Progression” teaching:

Cognitive Projects (Lower Grades): Focusing on mastering the application of a single skill or knowledge point, such as specific software operation projects, basic design principle application projects.

Specialized Projects (Middle Grades): Training centered around a core competency module, such as a complete UI design project, a small cultural and creative product design and prototyping project, a short video advertisement planning and production project.

Comprehensive/Cross-disciplinary Projects (Higher Grades): Requiring integrated application of knowledge and skills from multiple majors, completed by teams composed of students from different majors. For example, designing the appearance, interaction interface, and promotional plan for a smart home product, requiring collaboration among students from product design, UI design, advertising design, and even software majors. Introducing real enterprise projects or projects simulating real business environments. Project difficulty progresses from easy to hard, complexity from simple to intricate, requirements from single to comprehensive, and student roles from participants to leaders, gradually enhancing abilities in autonomous learning, problem analysis, problem-solving, and teamwork.

- **Stage 3 (Semester 6): Internship and Comprehensive Application Ability Enhancement.** Applying learned knowledge and skills in real work scenarios, independently or under the guidance of enterprise mentors, completing challenging graduation projects (designs), becoming familiar with enterprise operation processes and industry norms, enhancing career adaptability, achieving a “zero distance” transition from student to pre-professional, and aligning with employment positions. Includes internships and graduation projects (designs). Graduation project topics are closely linked to actual enterprise needs or student entrepreneurial intentions, emphasizing the practicality and innovation of the outcomes. Encouraging student

participation in various professional competitions to promote learning through competition and showcase learning achievements. (Table 1)

Table 1. Project-based Competency Progression Talent Cultivation Path.

Phase		Phase 1 / Stage 1	Phase 2 / Stage 2				Phase 3 / Stage 3	
Semester		Semester 1	Semester 2	Semester 3	Semester 4	Semester 5		Semester 6
Course/ Project			Project 1: Teacher-led	Project 2: Dual-mentor-led	Project 3: Triple-mentor-led	Project 4: Triple-mentor-assisted		Internship Project: Student-autonomous
	Professional Cluster Shared Platform Courses	Introduction to Big Data and Artificial Intelligence	Digital Creative Foundation	Big Data Business Planning		Shared Professional Cluster Core Courses	Smart Product Design and Development	Teamwork Ability
	Shared Professional Cluster Foundation Courses	Professional Cognition and Industry Research	Design Methods	Interface Design	Interaction Design		Smart Product Business Strategy Planning	Communication Ability
		Product Hand-drawing Expression Techniques	User Research	Market Research	Product Industry Research		Smart Product Preliminary Design Strategy	Self-management Ability
		Illustrator	Product Hand-drawn Renderings	Product Function and Structure Design	Product Form Semantics Design		In-depth Design and Image Design	Information Processing Ability
		Visual Composition	Product Craftsmanship and Molds	Appearance Mock-up Production	Product Form Design II		Testing, Improvement, and Marketing Promotion	Problem-solving Ability
		Photoshop	3D Rendering and Post-processing	Commercial Photography	Animation Design and Production		Smart Product Release	Comprehensive Ability
		CAD (Product	Live Streamin		Model Mock-up		Smart Product	Leadership

		t Drawin g CAD	g Producti on		Productio n		Brand		Ability
									Innovati on Ability
									Digital Creative Ability

3.3. Building “Creative Design + Digital Technology” Integrated Curriculum Teaching Resources: Content Reconstruction, Joint Construction and Sharing

Curriculum is the blueprint for talent cultivation, and teaching resources are the fundamental guarantee for implementing teaching. The professional cluster, focusing on the main line of integrating “Creative Design + Digital Technology,” has systematically reconstructed and built the curriculum system and teaching resources.

• **Curriculum System Reconstruction:** Breaking down the barriers of the original professional curriculum systems, and replanning curriculum modules based on the common talent cultivation goals of the professional cluster and the competency requirements of occupational positions (clusters). Constructing a modular curriculum structure of “Shared Platform + Core Competencies + Specialization Directions + Extension Modules”:

Shared Platform: Offered to all students in the professional cluster, laying a common theoretical, quality, and technical foundation. Examples: Introduction to Design, Introduction to Digital Creative Industry, History of Art and Design, Foundation of Form, Basic Design Software (e.g., PS, AI, Rhino), Programming Fundamentals, Innovative Thinking and Methods, Professional Literacy.

Core Competencies: Set around the core job competencies of the digital creative industry, elected by students from relevant majors according to their cultivation direction. Examples: Product Form Design, Ergonomics, User Research and Experience Design, Interaction Design Principles and Methods, UI Design and Specification, Advertising Planning and Copywriting, Digital Imaging Technology, 3D Modeling and Rendering, Fundamentals of Virtual Reality Technology Application.

Specialization Directions: Deepening courses set based on the specific specialization direction chosen by students (e.g., Product Form Design, Smart Product Design, Cultural and Creative Product Design, Advertising Design, Digital Media Design), highlighting directional characteristics.

Extension Modules: Meeting students’ personalized development needs, broadening knowledge horizons, and enhancing comprehensive literacy. Examples: Brand Design and Management, Service Design, Data Visualization, Intangible Cultural Heritage and Design, Entrepreneurship Fundamentals and Practice, Professional Competition Guidance.

• **Content Update and Integration:** Integrating the application of digital tools (e.g., Rhino for product form exploration, AI for graphic design), digital design methods (e.g., user data analysis guiding design decisions), and digital thinking concepts (e.g., iterative thinking, experience thinking) into traditional design courses. Offering courses like Smart Product Design and IoT Fundamentals to enable students to

understand the basic principles and design methods of smart products. Combining regional cultural characteristics (e.g., Huizhou culture), offering courses like Cultural and Creative Product Design, Digital Protection and Innovative Design of Intangible Cultural Heritage to cultivate students' cultural literacy and local innovation capabilities. Introducing aspects like cost accounting, market analysis, and marketing promotion into projects to cultivate students' awareness of the commercial value of design.

- **Teaching Resource Construction:** Building a shared teaching resource library for the professional cluster, integrating high-quality teaching resources from various majors, including electronic lesson plans, courseware, micro-lecture videos, case libraries, project libraries, training guides, online test banks, etc. Leveraging the college's advantages and local characteristics to focus on developing distinctive teaching resources. For example, the sub-project "Innovative Design of Huizhou Three Carvings" of the National Teaching Resource Database has been completed and shared externally. Planning to compile textbooks reflecting the "School-Enterprise Dual Co-construction" characteristic, such as "Digital Creative Product Design Training." Actively introducing high-quality online course resources, industry standards, and real enterprise cases from domestic and international sources to enrich teaching content. Establishing a management and update mechanism for the resource library, striving not only for sharing within the professional cluster on campus but also for wider sharing (e.g., among higher vocational colleges in the province, partner enterprises) to expand the reach of quality resources.

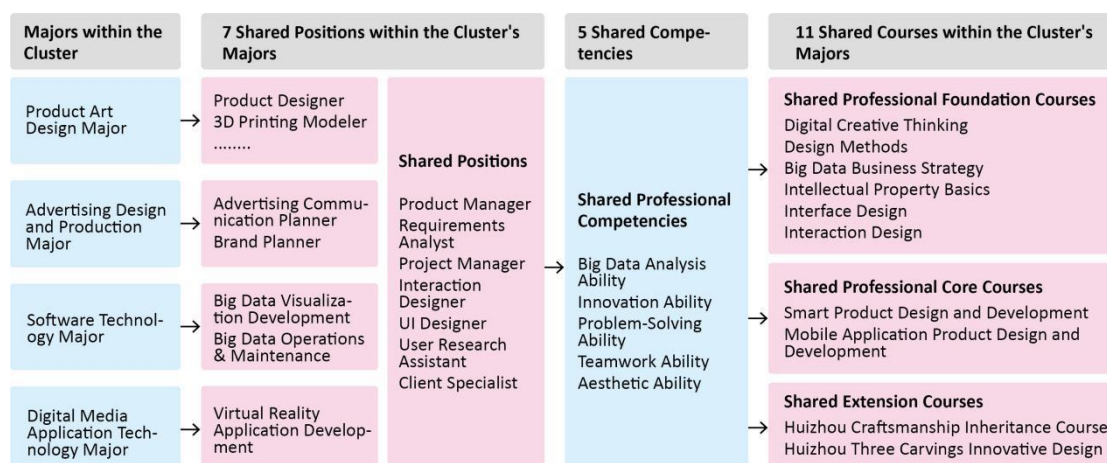


Figure 2. Creative Design and Digital Technology Integrated Curriculum Teaching Resources.

3.4. Cultivating a "Cross-disciplinary Integrated" High-Level Faculty Teaching Team: Internal Training and External Recruitment, Collaborative Effort

A high-level faculty team is the core guarantee for the quality of professional cluster construction and talent cultivation. Facing the demand for composite talent from the digital creative industry, the faculty team must also achieve "cross-disciplinary integration."

- **Team Composition and Optimization:** Team members include not only teachers from design majors like Product Art Design and Advertising Design but also absorb teachers from information technology majors such as Digital Media Technology, Software Technology, and Big Data Technology, forming an interdisciplinary structure.

• **Internal Training Enhancement and External Recruitment Supplementation:**

Internal Training: Organizing teachers to participate in training on digital technologies (e.g., new software, programming, VR/AR technology), educational technology, and teaching methods; encouraging teachers to obtain relevant professional qualifications or skill level certificates; sending teachers to partner enterprises for work-based practice or temporary assignments to understand front-line industry needs and technological dynamics, and accumulate practical experience; regularly conducting cross-disciplinary teaching seminars, collective lesson preparation, open classes, etc., to promote communication and learning among teachers.

External Recruitment: Hiring enterprise design directors, technical backbones, and project managers as adjunct professors or industry mentors to deeply participate in course teaching, project guidance, graduation design reviews, etc.; flexibly introducing master craftsmen and designers with profound expertise and industry influence (such as the already collaborating Huizhou wood carving intangible cultural heritage inheritor Wang Dehong and sculptor Ma Yechang), establishing master studios to enhance teachers' and students' technical skills and artistic cultivation through lectures, workshops, and apprenticeship inheritance.

• **Project Teaching Teams:** For comprehensive and cross-disciplinary projects, forming project teaching teams composed of teachers from different professional backgrounds and enterprise mentors, with clear division of labor and collaborative guidance. Actively cultivating and building provincial and national teaching innovation teams, forming a high-level teaching collective with a reasonable echelon, optimized structure, and vitality. Establishing a teacher resource database for the professional cluster to dynamically manage teacher information.

• **Goal:** Building a high-level “dual-qualification,” “cross-disciplinary” teaching team that possesses high moral standards, exquisite professional skills, a reasonable structure, and vitality; understands both “creative design” and “digital technology”; can both “teach” and “demonstrate”; and is competent to meet the talent cultivation needs of the professional cluster for cross-disciplinary integration.[4]

3.5. Constructing an Anhui Provincial High-Level Specialized Practical Teaching Base: Virtual-Real Combination, Industry-Education Integration

Practical teaching is the key link in cultivating students' technical skills and professional abilities. The professional cluster is committed to building a high-level, specialized, open, and shared practical teaching base that integrates teaching, practice, research and development, training, and service.

• **Enhancement of On-Campus Practical Bases:** Consolidating and functionally integrating existing centers and studios such as the 3D Printing and Maker Center, Video Effects Studio, Huizhou Art Research Center, UI Interface Studio, Exhibition Design Training Room, and Advertising Design and Production Integrated Teaching Workshop. Breaking the original boundaries of use segregated by major, making them open and shared across the entire professional cluster. Leveraging the advantages in Huizhou culture research, upgrading the Huizhou Art Research Center into a cultural and creative product R&D and practice base integrating research, design, prototyping, and exhibition. Actively involving well-known industry enterprises (such as D&D Innovation Group) in the construction and management of on-campus practical bases, introducing real enterprise projects, equipment resources, and technical standards into

the bases, achieving “enterprisation” in the operation and management of on-campus bases.

- **Expansion and Deepening of Off-Campus Practical Bases:** Actively expanding cooperative relationships with enterprises in different segments of the digital creative industry chain, such as digital content production companies, internet companies, smart hardware manufacturers, and cultural communication agencies, to build a diversified network of off-campus practical bases. The function of off-campus practical bases is not limited to student internships but extends to multiple levels such as curriculum embedding, customized training programs, project research and development, technical services, employee training, and student employment and entrepreneurship, forming a school-enterprise community with a shared future. Signing long-term, stable cooperation agreements with partner enterprises, clarifying cooperation content, methods, responsibilities, and rights. Establishing management and evaluation mechanisms for off-campus practical bases to ensure the quality of internships and practice.

- **Goal:** Building a batch of on-campus and off-campus practical teaching bases that are advanced in facilities, comprehensive in function, standardized in management, open and shared, and deeply integrated with industry and education. [5] These bases should meet the practical teaching needs of all majors and levels within the professional cluster, support the cultivation of students’ technical skills, innovation and entrepreneurship practices, and social service activities, striving to become leading, demonstrative high-level specialized industry-education integration practical teaching bases within the province.

4. Problems Faced and Prospects

Anhui Business Vocational College has made certain progress in the construction of the Product Art Design professional cluster, but still faces challenges: such as how to further deepen the integration of industry and education and establish a more stable and sustainable win-win mechanism for school-enterprise cooperation; how to more effectively achieve deep integration of curriculum content from different professional backgrounds and collaborative teaching organization; how to continuously improve teachers’ cross-disciplinary teaching capabilities and practical levels, etc.

Future efforts will explore establishing more flexible and efficient management and operational mechanisms for school-enterprise cooperation, promoting the model of jointly building R&D centers (studios) to achieve parallel development of talent cultivation and social services. Continuously optimize the curriculum system, strengthen the practice and research of cross-disciplinary project-based teaching, and explore more effective teaching organization models. Increase the intensity of faculty training, improve the mechanism for introducing enterprise mentors, and build a teaching innovation team with a reasonable structure and outstanding capabilities.

5. Conclusions

The vigorous development of the digital creative industry presents unprecedented opportunities and challenges for higher vocational product art design education. Constructing professional clusters is an effective path for higher vocational colleges to proactively adapt to industrial changes, deepen the integration of industry and education, and enhance the quality of talent cultivation. The practice of Anhui Business Vocational College shows that through clear goal positioning, innovative

“School-Enterprise Dual Co-construction” talent cultivation models, “Project-based Progression” cultivation paths, integrated curriculum resources, cross-disciplinary faculty teams, and high-level practical base construction, it is possible to effectively cultivate composite, innovative, high-quality technical and skilled personnel adapted to the needs of the digital creative industry. Its exploration and practice have positive reference significance for promoting the digital transformation and connotative development of art and design majors in higher vocational colleges in China.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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