

Comparative Study on the Curriculum System of Design Majors at Home and Abroad from the Perspective of Urban Digitization and Intelligence

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ABSTRACT

In the contemporary society where digital and intelligent technologies are deeply integrated, technological iteration drives the continuous evolution of the cognitive framework and methodological system of the design discipline, and puts forward higher requirements for the teaching of design courses. In order to meet the demand for composite design talents in the digital transformation of cities and cultivate high-quality composite talents with innovative spirit, practical ability, and interdisciplinary literacy, design majors at home and abroad are actively adjusting their professional curriculum systems. The article takes the digitization and intelligence of cities as the background, compares the similarities and differences between the curriculum systems of design majors at home and abroad, analyzes the problems existing in the curriculum system of design majors in China, and draws on foreign experience to propose optimization suggestions, in order to provide systematic suggestions for the digital transformation of design education in China.

KEYWORDS

Urban digitization and intelligence; Design major; Curriculum system

1 Research Background and Significance

Urban digitization and intelligence has become an important force to promote urban transformation and upgrading. Digitization and intelligence technology has not only profoundly changed people's lifestyles, but also had a profound impact on the field of design. As an important discipline for cultivating design talents, the curriculum system of design major needs to keep up with the pace of the times and adapt to the development trend of digitization. Colleges and universities should aim to cultivate digital and intelligent talents in key industries and fields closely related to future economic and social development, such as the information industry and cultural and creative industries, and meet the requirements of the information society for the knowledge structure and ability structure of talent quality and application-oriented talents, so as to serve the national and economic and social development in the new era^[1]. The focus lies on cultivating professionals with international perspectives, strong artistic literacy, and solid technical skills who can adapt to emerging technologies, application scenarios, and future trends in the digital economy. These individuals should comprehensively utilize innovative design thinking, creative methodologies, and practical design capabilities, contributing to the construction of a flexible, open, and personalized educational ecosystem.

Overview of Urban digitization and intelligence. Digitization refers to the process of deeply integrating digital technology and intelligent technology with urban economic and social development, and promoting the modernization of urban governance system and governance capacity. The United Nations New Urban Agenda regards digitization and intelligence as a key path to achieve the Sustainable Development Goals, and China's 14th Five-Year Plan also clearly proposes to accelerate digital development and build smart cities. At the same time, with the continuous maturity and popularization of technologies such as 5G and artificial intelligence, urban digitization and intelligence will usher in broader development prospects. By promoting the deep integration of digital and intelligent technology and urban governance system, urban governance and development will be further upgraded in the direction of intelligence, refinement and humanization. This global technological change has had a profound impact on the field of design. On the one hand, digitization technology provides more innovative means and practice platforms for design. For example, the use of virtual reality technology can realize the simulation and preview of the design effect, improve the accuracy and feasibility of the design; Assist designers in creative conception and scheme optimization, and improve the innovation and competitiveness of design. On the other hand, digitization and intelligence has also changed the way design talents are cultivated. Traditional design education focuses on the teaching of theoretical knowledge and skill training, while design education in the context of digitization pays more attention to the cultivation of interdisciplinary literacy and the improvement of practical ability. Therefore, the design major needs to keep up with the development trend of digitization, adjust and optimize the curriculum system to meet the needs of new design talents.

2 Reforms in Domestic Design Curriculum Systems

At present, the curriculum system of design majors in China mainly includes three parts: basic courses, professional courses and practical courses. The basic course focuses on cultivating students' artistic literacy and aesthetic ability, including training in painting, color, modeling, etc.; Professional courses focus on cultivating students' design ability and innovative thinking, including graphic design, interior design, product design, etc. Practical courses focus on cultivating

students' practical ability and teamwork ability, including project practice, graduation project and other courses. However, with the development and application of digital and intelligent technology, some problems have been exposed in the curriculum system of domestic design majors. For example, the integration of digitization and intelligence courses is insufficient, and there is a lack of curriculum content and teaching methods related to digitization technology. The traditional teaching model in China emphasizes rational concepts and principles, and the teaching model is outdated, lacking innovation and flexibility ^[2]; The evaluation system is not perfect, and too much attention is paid to the assessment of theoretical knowledge and the evaluation of practical ability and innovation ability is neglected. In recent years, major universities in China have made overall adjustments to the curriculum and system of design disciplines in line with the trend of digitization and intelligence.

2.1 Strengthening Cultural Literacy Education

With the continuous acceleration of the process of digitization, the efficiency and expressiveness of design have been greatly improved, but the risk of homogenization of design works at the formal and technical levels has also greatly increased, and cultural literacy, as the soul of design, has become increasingly important. Therefore, in the basic course of design discipline, paying more attention to the integration of cultural connotation has become an important direction of reform. By introducing the excellent traditional Chinese culture and telling the story of Chinese culture, students can learn design skills while establishing a correct concept of creation, deeply understand the connotation and value of culture, and better reflect cultural characteristics in design works ^[3]. At present, the basic courses of design schools of major universities in China not only have the course "History of Eastern and Western Design", but also many colleges and universities have added courses related to traditional Chinese culture. For example, the School of Design of Beijing Institute of Fashion Technology has "History of Oriental Art and Design", and some majors have traditional related courses such as "Calligraphy Art"; The first-year basic courses of Tsinghua University include courses such as "Gongbi Flowers and Birds", "Freehand Flowers and Birds" and "History of Chinese Arts and Crafts". It can be seen that major universities in China attach great importance to integrating cultural education into the curriculum system of design disciplines.

2.2 Enhancing Interdisciplinary Integration

As a comprehensive and interdisciplinary discipline, design needs to continuously absorb and integrate the latest achievements of other disciplines to enrich and improve its own knowledge system. In the reform of professional curricula, the strengthening of interdisciplinary integration has become a bright spot. Through the cross-integration with other disciplines, the basic course of design discipline not only broadens students' knowledge horizons, but also promotes cultural exchanges and collisions between different disciplines, which helps to cultivate students' comprehensive literacy and innovation ability. In recent years, with the rapid development of convergent media and network technology, a series of adaptation measures have been made to the professional courses of many subordinate disciplines of design, such as the visual communication major of Beijing Institute of Technology, such as "Digital Display Design", "Interface and Interaction Design", "Image Narrative Design", "Information Visualization Design" and a series of new courses, aiming to cultivate open and innovative talents with multi-dimensional creativity and integration of multiple professional knowledge and experience.

2.3 Deepening Design-Technology Synergy

In the context of digitization, the design industry is undergoing a transformation from traditional design to digital design. Design Disciplines need to keep pace with the needs of industry developments. In order to adapt to the development trend of digitalization, the design major needs to further promote the integration of digital technology courses. Many universities have launched a range of new courses related to digital technologies to develop students' digital skills and innovation. For example, the Xi'an Academy of Fine Arts has set up a major in art and technology, with the direction of digital exhibition space design as the core, and the interdisciplinary system of "art and science integration" integrated into the teaching concept (Fig. 1), deeply exploring the interdisciplinary research field under new media, and is committed to integrating art, design, science and technology, integrating the perspectives of space, art, media, technology and business, and presenting creative achievements in an innovative way.

2.4 Cultivating Innovative and Critical Thinking

With the rapid development of digital technology, the traditional curriculum system based on skills transfer can no longer meet the needs of the new era. The cultivation of innovation and critical thinking has become an important way to promote design education to adapt to future challenges, and the curriculum of design discipline needs to pay more attention to cultivating students' open thinking and reflection ability. At present, some colleges and universities have set up targeted courses at the level of design thinking. For example, the courses related to "Design Management", "Design Planning" and "Design Criticism" added to the art and design curriculum system of the China Academy of Art explore how to use the thinking of oriental design to cultivate and train a new attitude towards design, and at the same time guide students to use the subjective and objective criteria and evaluation modes of design evaluation to examine various types of design, and pay attention to and think about the problems faced by contemporary design.

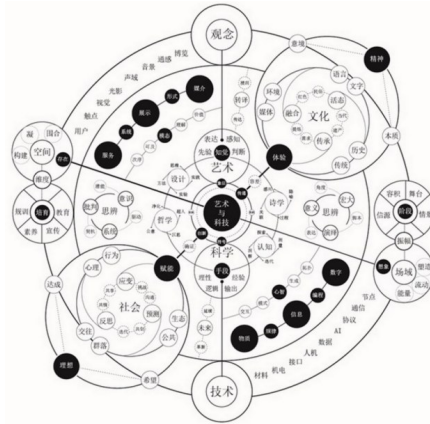


Figure 1 Xi'an Academy of Fine Arts is an interdisciplinary teaching concept of "integration of art and science"

3 Current Status of International Design Curricula

3.1 Integration of digitization and intelligence Technologies

The curriculum system of foreign design majors has also been adjusted and optimized accordingly in the context of digitization and intelligence. On the one hand, foreign design majors focus on integrating intelligence technology into the curriculum system, and have opened a series of courses related to digitization and intelligence technology, such as digital media design, interaction design, etc. These courses not only focus on the imparting of theoretical knowledge, but also on the cultivation of practical skills and the stimulation of innovative thinking. For example, the MIT Media Lab's "Generative Design and Artificial Intelligence" course focuses on "AI-driven design" and deeply integrates generative adversarial networks, parametric design tools, and machine learning techniques to promote the innovative development of automated design prototypes. In the course, students use Python algorithms to generate architectural forms and product structures, and use AI to optimize material efficiency and functional layout, explore and solve complex real-world problems in real situations, and exercise innovative thinking and practical skills. In addition, in the Intelligent Product Design ("Intelligent Product Design" course of the Innovative Design Project jointly offered by the Royal College of Art and Imperial College London, students design IoT devices that use sensors to collect data in real time, machine intelligence to learn to analyze user behavior, and develop augmented reality interfaces using Unity technology tools.

3.2 Cross-Disciplinary Collaboration and Global Partnerships

On the other hand, foreign design majors focus on interdisciplinary integration and international cooperation. Through cross-learning and international exchange with other disciplines, students will broaden their knowledge horizons and innovation ability. For example, the Communication Design program offered by Parsons School of Design allows students to learn and collaborate with students in the liberal arts, social sciences, and technology to explore the relationship between design and broader social, technological, and cultural issues. In terms of international cooperation, the Master's Program in Integrated Product Design, set up by the School of Design of Politecnico di Milano in Italy, requires students to complete joint design projects of multinational companies under the framework of the European Union's Erasmus+ program, so as to enhance students' ability to cooperate across borders.

3.3 Innovative Pedagogical Approaches

In addition, foreign design majors also pay attention to the innovation of teaching methods and the diversification of teaching modes. For example, the HOTWEEK workshop at the National Academy of Arts in Oslo, Norway, sets an open-ended and inspiring theme each year, which can lead students to think and create from different perspectives, and students need to quickly turn their ideas into practical works, which not only tests their design skills, but also their strong hands-on skills and time management skills ^[4]. In addition, with the increasing global focus on sustainability, the Rhode Island School of Design (RISD) in the United States introduced the OBE concept and designed the "Sustainable Design" curriculum to develop students' awareness of sustainability as a goal. Stanford University's School of Design adopts "Design Thinking" as the core teaching method, and designs the course into five stages: empathy, definition, ideation, prototype and testing, which is people-oriented, emphasizing understanding the needs and pain points of users through empathy, and cultivating students' systematic design thinking and problem-solving skills.

4 Recommendations for Optimizing Domestic Design Curricula

4.1 Deepen digitization and intelligence Integration with Practical Focus

The domestic design curriculum system should take "digitization empowering design thinking, data-driven innovation practice" as the core logic, and build a multi-dimensional collaborative digitization practice framework at different levels. In terms of the underlying architecture, the theoretical foundation of data literacy and intelligent technology should be

strengthened, and courses such as intelligent interaction design and generative design should be set up to cultivate students' digital insight. Algorithmic thinking is integrated into the method layer, so that students can promote the application and transformation of design ideas through modular practices such as generative AI design and parametric modeling. At the same time, it strengthens in-depth cooperation with the industry, establishes a stable school-enterprise cooperation mechanism, and can build a cloud-based industrial-level project collaboration platform to give students insight into the industry and market demand. It is also necessary to optimize the evaluation system of digitization practice teaching, ensure that digitization practice conforms to humanistic design values, and pay attention to the comprehensive evaluation of students' digitization practice process, innovation ability, teamwork ability and other aspects to Encourage students to actively participate in hands-on learning.

4.2 Innovate Teaching Methods and Cross-Disciplinary Fusion

In view of the problem of outdated and rigid teaching models, it is recommended to introduce flexible teaching modes such as "theme workshop design" and "based on OBE concept" in foreign universities, so that students can integrate into the immersive teaching environment, participate in highly practical teaching links, and continue to cultivate design and creation ability guided by target results. Secondly, drawing on the experience of foreign interdisciplinary integration, the domestic design major curriculum system should break the barriers of traditional disciplines, build a compound curriculum system of "design + technology + humanities", and cultivate students' ability to comprehensively use multidisciplinary knowledge to solve problems. The modular teaching mode is adopted to disassemble the problems of design projects into interdisciplinary topics in the "design+" mode, which are completed by teachers and students of different majors in collaboration to cultivate students' systematic thinking and teamwork skills.

4.3 Expand Global Collaboration for International Competence

In the international expansion of the curriculum system of design majors in China, it is necessary to build a "borderless collaboration network" with digital and intelligent technology as the link, and break the geographical and cultural barriers through the integration of virtual and real technologies. Design majors in domestic universities can establish an international design exchange platform and invite global scholars to give online lectures to ensure that the course content is in sync with international trends and cultivate globally competitive design talents. At the same time, a transnational cloud joint laboratory can be set up, and the global design trend database and model library can be integrated with blockchain technology, and students can be encouraged to use online platform resources to participate in transnational design projects. In addition, we have established a faculty mobility mechanism, carried out cross-border collaborative teaching through the virtual teaching and research department, used an intelligent matching system to connect with international industrial project resources, introduced international experts in the field of digitization with both design theory and practical experience, and regularly selected teachers to go overseas for training to learn cutting-edge teaching concepts and technology applications, and optimize the structure and strength of teachers.

5 Conclusion and Outlook

Through the comparative analysis of the curriculum systems of design majors at home and abroad, it is found that from the perspective of urban digitization and intelligence, foreign design education pays attention to interdisciplinary integration and the cultivation of practical innovation ability, integrates cutting-edge digitization technology modules such as artificial intelligence and big data into the curriculum system, and strengthens students' digitization technology application ability through school-enterprise and international cooperation. Although the curriculum system of design majors in China has gradually introduced digitization content, there are still some problems, such as obvious disciplinary barriers, insufficient depth of introduction of digitization technology, and lagging construction of practice platforms. In the future, the curriculum system of design in China needs to be guided by the needs of digitization, optimize the framework of the curriculum system, innovate teaching methods, strengthen the interdisciplinary integration of "design + digitization", rely on real design projects, and optimize the collaborative mechanism of production and education, so as to cultivate compound design talents with both innovative thinking and digitization technology application ability.

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