

Practice and Inheritance of Industrial Heritage in Environmental Design Teaching

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Received: 25 November 2020; **Accepted:** 15 December 2020; **Published:** 5 January 2021

Abstract:

By setting up a gradual training plan of environmental design practice teaching curriculum system, the industrial heritage project is introduced into the undergraduate practice teaching in different stages from simple to deep. Targetedly guide students to explore the value return of industrial heritage integration “local” concept. In the course of practice system, students systematically master the new standards of heritage renewal, the extraction of creative elements, the reconstruction of space and the remodeling of value. Further improve students’ capabilities of deep design and scientific research.

Keywords:

Environmental Design, Industrial Heritage, Practice Teaching, Cultural Heritage

1. Introduction

In the information age, especially today when the Internet is deeply involved in production and life, industry is no longer a symbol of productivity, especially traditional industry. With the change of social production structure, a large number of industrial wasteland has become the focus of attention of cities. It is a new challenge for the sustainable development of the city that how to protect and transform it reasonably, reserve the place which can contain its own historical trace for the city and endow it with new value at the same time. The design major in colleges and universities also needs to have strong adaptability to face the social changes. The history, culture and environment of the city have become the main concern of the design major. Similarly, in order to adapt to the development of urbanization, it is necessary to cultivate design talents with keen observation and innovative practice ability to urban history, culture and environment.

2. Current Situation of Practice Teaching of Environmental Design Major

Environmental design is a comprehensive and applied major, which requires students to have a high awareness and innovation in design practice; at the same time, environmental design is also an interdisciplinary comprehensive major, whose

teaching system involves art, architecture, landscape, furnishings, public art, ergonomics, materials science and other fields, especially in the inheritance and inheritance of urban cultural heritage. In terms of redesign, the trend of design to connotative development is more and more obvious [1,2,3]. The Department of environmental design, college of art and design, Inner Mongolia University of Science & Technology, has continuously adjusted the training program and formed a relatively complete teaching system relying on the characteristics of the region. With the increasing proportion of project practice and regional culture research in the training of environmental design major, especially in the practice of thematic design, scientific methods are used to study local environmental problems, and the practical links include investigation, analysis, discussion, design and production, reasonable and effective design solutions are obtained through modification and integration. At the same time, it can combine the social, cultural, economic, legal, safety and environmental factors into consideration, reflect the innovation consciousness in the design process, also take serving the needs of local economic development and cultivating talents with dual abilities of application and research as the main goal.

3. Teaching Practice of Industrial Heritage Project in Environmental Design Course

3.1. Overview of Industrial Heritage Culture

Baotou, the city where Inner Mongolia University of Science & Technology is located, has a heavy industrial background. Baotou Steel, north heavy industry, nuclear industry 208 and many other enterprises are distributed in the urban area alone. In the process of upgrading, the stock of industrial heritage is very considerable. It can be said that industry is an important line of urban renewal and development. Fully mining and refining the connotation of urban culture can make undergraduate students understand the value of industrial heritage and inherit industrial culture in practice. In 2016, the Ministry of industry and information technology and the Ministry of Finance proposed in the guidance on promoting the development of industrial culture that industrial culture is the sum of material culture, institutional culture and spiritual culture formed along with the industrialization process and penetrated into the industrial development. In 2020, the national development and reform commission and other five departments jointly issued the implementation plan for promoting the protection and utilization of industrial heritage in old industrial cities. The first principle put forward is to give priority to protection and use to promote protection. Industrial heritage is the witness of industrial city civilization and the representative of advanced socialist culture. As a Local Application-oriented Undergraduate College Environmental Design Major, taking the construction of practical curriculum integration project as an opportunity, explores the coupling between culture, landscape, ecology and environment from the industrial heritage transformation project, so as to add new impetus to the development of industrial cities. At the same time, it also helps to give full play to the role of industrial heritage culture in educating people and encourage young students to work hard and take responsibility with the spirit of industry. [4,5]

3.2. Practice Course Arrangement

Environmental design (1) - (5) is a subject practice curriculum system with increasing difficulty throughout sophomore to senior four. The time span of each

project design is half a year. Through five semesters of teacher-student interaction and team cooperation, students' logical thinking, practice and innovation ability and comprehensive application ability are cultivated. It lays a foundation for the practice courses of designer business practice and graduation design in the eighth semester of senior year. The curriculum system requires the training of the spatial boundaries in the three scales of macro, meso and micro. Starting from the large-scale urban regional environment, through observation and mapping, the paper describes the composition and boundary of space, indoor and outdoor environmental elements and component types, site, architecture, behavioral function composition, material types, etc., and completes the Research Report; based on the cognition of the investigation and analysis, it gradually focuses on the medium-sized building units, landscape nodes and small-scale. In order to make students master the conception process and scheme making process of indoor and outdoor environment design, the paper puts forward the design concept, demonstrates the design idea and carries out the theme concept design.

3.3. Industrial Heritage Projects Involved in Environmental Design Practice Teaching

The integration of industrial culture into practical courses starts from the search for lost industrial land in the city, collects the industrial declining areas scattered in various areas of the city, comprehensively sorts out, analyzes and classifies the industrial cities and industrial history and culture, and then evaluates the overall value of industrial heritage sites, buildings and landscape environment according to the problems found in the investigation. The design process includes target positioning, function replacement, space reconstruction, and field design and so on.

Taking Baotou sugar factory industrial heritage project involved in environmental design (4) as an example, environmental design (4) is an advanced stage of practical advanced course, which is arranged in the second semester of junior high school, focusing on the cultivation of students' scheme design ability and comprehensive skills in a large scale of public space. Baotou sugar factory industrial heritage project, as a large-scale sugar beet machinery factory, is the living fossil of industrial development and Reform in Western China. The No.1 building of the plant area was listed in the first batch of historical buildings in Baotou city. Students should seriously consider the complex relationship between space and emotion, architecture and city. In addition, the planning of the abandoned plant area basically preserves the appearance of the construction and prosperity period, covering a total area of 30.9 hectares. The original appearance of the plant buildings in different historical periods is preserved. The site is intact, including production area, office area, storage area, packaging area, drying area, sugar beet test field area, open sky stacking site and reserved area. Students should start from the function of the site and strengthen the visual presentation of the design. The course design is a systematic process of completing the project from the formulation of the assignment, the investigation plan, the analysis of the current situation, the concept proposal, the preliminary scheme, the scheme deepening and the design report. Teachers and students can deeply understand the cultural and historical nature of industrial heritage through the interpretation of the assignment book, field investigation and many times of analysis and discussion, analyze the current situation of the site, discuss the design concept, determine the design theme, promote the two-way interaction between teachers and students, and stimulate students' multidimensional thinking and innovative practice. The course

training is to train students' team cooperation ability in the form of group. The course training process also guides students to establish the industrial spirit of hard work and hard work and the values of not forgetting the history and inheriting the mission.

3.4. Visual Analysis, Value Analysis and New Standards for Industrial Heritage Renewal

Analysis of visibility elements. This link in teaching is based on GIS scientific calculation of spatial elements classification, classification control data. The three-dimensional attributes of the site area and the friction factors of the surrounding space distance are found out, and the classification basis of spatial elements is obtained through density analysis, so as to further determine the overall protection pattern of heritage space. In order to distinguish the spatial differentiation characteristics of the site, it is necessary to analyze the core of the spatial agglomeration. Taking the site as the center, the higher the grid unit density and the higher the nuclear density value in the surrounding radiation radius, the higher the distribution density of buildings and population. It includes building density analysis, surrounding land use function analysis, traffic network analysis, elevation analysis and horizon analysis. Based on this, the paper analyzes the existing problems in material space, traffic organization, surrounding relationship, population structure, site function and so on. [6]

Industrial heritage value analysis. The basic values of historical value, technical value, aesthetic value, social value and spiritual value of industrial heritage are obtained from questionnaire data statistics. Combined with literature search and collection of factory history archives, in-depth analysis and transformation demonstration are carried out. A feasible scheme is worked out step by step to maximize the use of heritage value. [7]

Industrial heritage adaptive redesign. Under the premise of preserving the authenticity of the space, the system considers the site landscape, architecture, interior and other elements, fully integrates the local value and the industrial heritage value, and transforms the static protection into the living protection; through the processing methods such as function replacement, disassembly and reorganization, micro update, combined with modern means such as Internet +, digital information technology, etc., to achieve the integration of the plant and the ecological environment He, the reconstruction of historical scene and technological process, the continuation of social value and spiritual value. [8]

3.5. Integration of Creative Elements into Design Concept

The extraction of creative elements is based on the full excavation of the constituent elements, morphological composition and heritage value of industrial heritage, and the transformation of industrial cultural factors into creative elements requires students to try to study the formal language and methods of transformation [9]. As a heavy industrial city, Baotou's industrial heritage has the characteristics of solid structure, large volume and cold material. The common components include crane, industrial blast furnace, storage tank, automatic production line, large-span production plant, office buildings, storage and transportation facilities. The ups and downs of this equipment together constitute a vivid Industrial Symphony. Each industrial unit in different combinations highlights the unique industrial landscape of the region. In the teaching, we guide students to find the beauty of the combination, excavate the intrinsic value behind the combination, strive to maintain its prominent personality in the transformation, and then fully consider the scale and practical needs of people to

make the industrial heritage “useful”. The design of “rust green trace square” takes an abandoned industrial parcel in the central area of the city as the design object, mainly highlighting the contrast between “rust” and “green”. It combines a large number of abandoned steel plates left in the industry with green space in the way of paving, inlaying and interspersed, and empirically integrates the mechanical equipment left over from the site, such as “exudation separator”, “distillation equipment” and “steam turbine” “Machine” and other industrial equipment were combined and transformed into rainwater filtration facilities to collect rainwater, separate rainwater and sewage, recycle utilization, water quality treatment, and conserve soil. The ecological concept and the matching industrial elements were refined to meet the sense of form and practicality, and effectively improved the land environment.

3.6. Space Reconstruction and Value Reconstruction to Build a New Space for Industrial Heritage

Under the premise of preserving the authenticity of the original industrial heritage, the space reconstruction of industrial heritage is to inject the abandoned industrial site into the cultural gene and industrial life, endow it with modern functions, wake up the industrial land, and make “the old bottle is old and the old is old, and the old appearance is new”. The value of site architecture, landscape, traffic and other elements in the protection and renewal should be considered, and the development and utilization of the retained value should be maximized. Guide students to regard the industrial heritage as an organism connecting with the city. In the process of differentiation, integration and integration of industrial heritage, the preservation, transformation and elimination of industrial heritage are determined according to the value evaluation in the early stage, so as to transform the industrial relics into cultural blocks, squares, cultural and art centers suitable for modern life. In the course practice, students gradually learn to integrate the building plant, machinery and equipment, plant environment and other material heritage into the contents of art, culture, popular science, catering, entertainment and other contents according to their structure and value, so as to create a modern new space integrating modern work, leisure, commerce, conference, accommodation and display. According to the functional orientation, the transformation mode is micro renewal and structural update. Through the adjustment of the spatial pattern, the design of environmental elements, the design of energy-saving materials, and the internet information exchange platform, the students’ ability to solve complex spatial problems in industrial heritage projects can be cultivated, and then the industrial heritage can be reborn by creative scientific and technological means. It includes not only architecture, landscape, interior, but also service design and public art. Through the research and excavation of local material and intangible culture, including industrial heritage itself, students try to improve the cultural added value of industrial heritage by means of functional grafting, and recombine industrial heritage and local culture.

3.7. Activate and Utilize Industrial Heritage to Stimulate Urban Vitality

The spirit of place comes from architectural phenomenology. The activation and reuse of industrial heritage focuses on creating experience space with place spirit, sublimating the protection of heritage to cultural protection; the site experience space of industrial heritage mainly includes production process experience, historical and cultural popular science education, promotion of regional characteristics, etc., and can also be multi-dimensional experience of time, space and emotion. [10] Through

questionnaire and hierarchical statistics, students pay attention to the specific users of industrial sites and the regional culture carried by material and non-material elements, and design the scheme on the basis of analysis. “Design of red box art gallery” is based on the Soviet building in Wudanggou mining area in Shiguai. The original building was a four storey brick concrete office building in the 1950s, with spires, symmetry, red bricks and wooden windows. The facade of the building has white separation lines and red slogans from the 1970s. “Red box” conveys the information of a red cultural gene, and carries forward the collective memory of a generation and the red spirit of “fighting heaven and earth, struggling hard” in the mining area. In terms of interior design, it selectively retains the artistic characteristics of repetition, symmetry, geometry and rhythm of Soviet style architecture; according to the requirements of exhibition space, the interior space and material of the building are superimposed, mutated, reconstructed and disassembled, so as to convey the multilevel nature of exhibition space and the review of history from the perspective of aesthetics. Try to connect the artistic value of this kind of architecture with the function value of the art gallery, and sew up the history and spread the culture. In the process of practice, students gradually understand the characteristics of architectural space, structural form and material characteristics, and connect the users, collective memory and the construction site into a whole, that is, the segmented design of industrial heritage scene space based on the collective memory of users, so as to create a situation, become the carrier of memory, and retain the history of memory in the flashback of space.

4. Conclusions

The environmental design department of the school of art and design of Inner Mongolia University of Science & Technology integrates the project teaching of industrial heritage into the practical teaching, so that students can understand the interrelationship of city, space and environment from a multidimensional perspective and carry out specific design. The establishment of a set of characteristic teaching of industrial city industrial culture involved in the environmental design practice of local undergraduate colleges mainly includes the following points: inheriting the cultural characteristics, spirit and connotation of industrial city, comprehensively combing the cultural value of urban industrial heritage; activating industrial heritage, integrating into the organic renewal of the city, improving the design horizon from a comprehensive perspective; deeply excavating the industrial heritage culture, emphasizing the place spirit of industrial remains; Through ideological and political ideology and industrial spirit to stimulate students’ patriotic feelings. The industrial heritage project involves in the reform of environmental design practice course, which emphasizes the local spirit of industrial heritage, explores new utilization methods of industrial heritage by adopting the overall and systematic design concept, ensures that heritage protection is closely linked with the organic renewal of the city, and becomes the most grounded and timely practical education mode for future talent cultivation. In educational practice, the teaching team will continue to deepen the training program and continuously promote the scientific construction of practical teaching system.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Funding

This work was supported by the exploration and practice of innovation research on regional characteristic cultural heritage in postgraduate teaching of design art in the graduate education and teaching reform research and practice of Inner Mongolia Autonomous Region in 2020.

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