Reflection on the Practice Course of Architecture Based on the Concept of OBE

Taking the “Cooperation Between School and Local Government” Based Graduation Design as an Example*

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Abstract—In 2019, the Ministry of Education implemented the "double ten thousand plan" on a national scale, and its teaching concept coincides with the OBE concept that advocates results-oriented education. The OBE concept determines the training goals of professional talents by taking the students as the center and the demands of country and society as the orientation, so as to determine the graduation requirements of the students, that is, the ability of the students to graduate will ultimately determine the course design. Taking the 16 year graduation project based on "the cooperation between school and local government" carried out by the School of Design of Yunnan Arts University as an example, the paper discusses the application of OBE concept in the graduation design from three aspects of talent training goals, teaching plans and course setting.

Keywords—OBE concept; reverse design; graduation design

I. INTRODUCTION

On January 30, 2018, the Ministry of Education issued the National Standard for Teaching Quality of Undergraduate Majors in General Institutes of Higher Education, which centers around three aspects: student-centered, output orientation and continuous improvement. In June 2018, Wu Yan, director of the Department of Higher Education of the Ministry of Education, put forward the implementation of "double ten thousand plan" for the construction of first-class undergraduate majors, and the Notice on the Implementation of the "Double Ten Thousand Plan" for the Construction of First-class Undergraduate Majors was officially issued in April 2019. In November of the same year, the Ministry of Education will implement the "double ten thousand plan" for the first-class undergraduate courses. The "double ten thousand plan" of majors and courses will continue to stick to the educational concept of "student-centered, output orientation and continuous improvement", which coincides with the concept of Outcome-Based Education (for short OBE).

II. CONNOTATION OF OBE CONCEPT

OBE is the abbreviation of Outcome-Based Education, which was first proposed by Spady in 1980s. The OBE concept points out that the goals of teaching design and teaching implementation is the final teaching achievements achieved by the students through the teaching process, which is oriented by the ability, goal and demand of the students.¹ OBE concept is widely used in the field of engineering education, and accepted by the Washington Agreement for mutual recognition of undergraduate degree in international engineering. China has been an official member of the Washington Agreement. Although the architecture major is very common in a large number of colleges and universities, including arts universities, it belongs to the engineering course in China. Therefore, OBE concept is urgently required to guide the educational development of discipline. As the environmental design major in Arts University, it also requires this educational concept because of its prominent engineering properties. In September 2018, the Ministry of Education, together with the Ministry of Industry and Information Technology and the Chinese Academy of Engineering, issued the Opinions on Accelerating the Construction and Development of New Engineering Course to Implement the Education and Training Plan for Outstanding Engineers 2.0. Under such a background, the OBE concept is proposed again, which comes at the good time and comes just at the right time.

¹ With reference to Li Zhiyi. Establish the OBE Concept to Build First-class Major. Symposium on the Construction of First-class Undergraduate Major against the Background of “Double Ten Thousand Plan”. Xi’an. November 2019)
The OBE concept determines the training goals of professional talents by taking the students as the center and the demands of country and society as the orientation, so as to determine the graduation requirements of the students, that is, the ability of the students to graduate will ultimately determine the course design (as shown in "Fig. 1"). This is a reverse design process. The so-called reverse design is that course design determines all the teaching adaptability towards the peak results from the reverse design of final results (peak results). The starting point of teaching is not what teachers need to teach, but what is needed to achieve peak results.2

III. DEVELOPMENT OF ARCHITECTURE MAJOR

The modern architectural education in China can be traced back to the Bauhaus teaching system founded by Walter Gropius in Germany in 1919 a century ago. "At that time, it was because Walter Gropius actively sought to contact with industrial circles and business circles that Bauhaus could break through the shackles of small commune and Utopia and creatively establish a pragmatic design concept that was oriented to the society and the public.3 Bauhaus emphasized that the need of the society should be as the orientation, paid attention to the creative process of students and also emphasized the importance of practice.

In 1942, Mr. Huang Zuoshen, who once followed Walter Gropius, first introduced the Bauhaus teaching concept to the department of architecture of St. John’s University (the predecessor of the department of architecture of Tongji University). In 1946, Mr. Liang Siqiang founded the department of architecture in Tsinghua University, and proposed that "the academic training is divorced from the reality, and he hoped to learn from the Bauhaus teaching advocated by Gropius that was the combination of design courses and workshops".4 But in the 1950s, because China learned from the Soviet Union in an all-round way, the architectural education returned to the Boojia system. Until the 1980s, the Bauhaus concept swept the country.

In 2016, China joined the Washington Agreement. The Washington Agreement puts forward the concept of "graduate core competence", that is, the ability of students to enter into professional work after graduation. Therefore, the Washington Agreement has the trend of returning to students’ learning results-oriented certification.5 In recent years, all western countries under the Washington Agreement have emphasized that the students should provide capstone courses before graduation. "The capstone course emphasizes the team work, can be divided into a group of three or five, focuses on hands-on and design, integrates the knowledge that have learned to solve practical engineering problems, and the written and oral

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2 With reference to Li Zhiyi. Establish the OBE Concept to Build First-class Major. Symposium on the Construction of First-class Undergraduate Major against the Background of “Double Ten Thousand Plan”. Xi’an. November 2019

3 Cao Tian, Li Qian’an, Guo Yu and Chi Wei. Talk of Four People: the Bauhaus Educational Heritage in the Contemporary Era [J]. Chinese Art, 2018 (1), P95.

4 Zhang Yiwei, Gu Daqing. Traceability and Evolution: Two Introductions of “Bauhaus Preliminary Course” in China’s Architectural Education [J]. Architect, 2019 (4), P56.

5 Yang Yongbin, Li Peilin, Liu Manjun. Development Trend of World Engineering Education Certification [J]. Higher Engineering Education Research, 2019 (5), P6.
IV. PRACTICE AND REFLECTION OF GRADUATION DESIGN BASED ON "THE COOPERATION BETWEEN SCHOOL AND LOCAL GOVERNMENT"

The graduation design in our school also follows the OBE concept, formulates talent training goals and teaching plans by starting from the needs of the society, further determines graduation requirements, so as to arrange graduation design courses.

A. Talent Training Goals for Local Development

Yunnan Arts University belongs to local university. The talents that they cultivate not only conform to the needs of national development, but also serve the local social, economic and cultural development. Therefore, the training of architecture major talents in our university adapts to the needs of national economic development and urban and rural construction, has good architectural major knowledge and planning and design practice ability, has innovative thinking, open vision, social responsibility and team spirit, and has the concept of sustainable development and cultural heritage. The talents mainly are in architectural design, urban and rural planning and management, landscape planning and design units, educational and scientific research institutions, management departments and others to engage in architectural design, urban and rural planning, landscape planning, historical building protection design, teaching and research, development and management. Meanwhile, by following the school-running principle of "inheriting tradition, learning from the folk, compatible with China and foreign countries and serving the society", the school should train the high-level specialized applied talents who are rooted in the local multi-ethnic characteristic culture, master the basic theory and design method of the architectural discipline, familiar with the development trend of new technology, have higher architectural aesthetic design accomplishment, strong foundation of architectural art creation, strong performance ability, and have innovative spirit and open vision.

B. Ability-oriented Teaching Plan

Based on the five-year talent training goal of architecture major, our school has formulated the "2 + 2 + 1" teaching plan that takes the ability of the students as the orientation. Among them, the first to the second grade is the basic platform, and the students will mainly be trained in the basic drawing and drawing identification ability, the basic scheme conception ability and the basic scheme design ability through the basic training of the first grade and the introduction to design of the second grade; the third to the fourth grade is the professional platform, the students will mainly be trained in the professional ability to express design problems, ability to analyze design problems, ability to solve design problems through the professional expansion of the third grade and the systematic training of the fourth grade; The fifth grade is a comprehensive platform, the students will mainly be trained in the ability to observe and find design problems, design ability of team spirit cooperation, and ability to comprehensively solve design problems through comprehensive application (as shown in "Fig. 2").

Among them, the graduation design of the fifth grade has deeply practiced the teaching reform mode of "government, production, teaching, research and application". With the national culture inheritance as the core, the cooperation between school and local government as the basis, and the characteristic teaching reform as the means, it has made a large number of achievements in inheriting national culture, mobilizing enterprise development, helping local cultural products to transform and self-improvement in scientific research, and has also been widely recognized by the society. From the perspective of talent cultivation, the "school and local government cooperation national culture creative design" actually combines the advantages of cultural and natural resources with regional characteristic with the design creative methods. While inheriting the characteristic national culture, it opens up a specialized way of creative industry talent cultivation.

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Yang Yongbin, Li Peilin, Liu Manjun. Development Trend of World Engineering Education Certification [J]. Higher Engineering Education Research, 2019 (5), P8.
### C. Student-centered Graduation Design

1) **Curriculum requirements:** As an essential content for colleges and universities to achieve the goal of undergraduate education, graduation design is both the last important teaching stage before graduation and an important process of deepening and sublimating professional learning, and also a comprehensive examination on students’ comprehensive quality, practical ability and innovative consciousness, or even a comprehensive summary of students’ theoretical learning and practical achievements, as well as the important basis of graduation and degree certification, constituting an important content to measure the quality of education and evaluate the benefits of running a college. It is an important and comprehensive part in training qualified undergraduates and is of great significance to cultivate students’ scientific research ability and innovative thinking, and to test students’ comprehensive knowledge level. The knowledge summary and creative design on the basis of practice can improve students’ professional level, laying the foundation for making them become innovative and qualified talents. Graduation design is also a process of combining theory with practice, not only an essential teaching stage of undergraduate education of architecture, but also an important way of carrying out comprehensive quality education on students. It has an function irreplaceable for any single classroom teaching or practice teaching, so it plays an extremely important role in the cultivation of talents in this major. The graduation design emphasizes centering around students and pays attention to the its process and output.

2) **Teaching objective:** The teaching objective for the part of graduation design is to cultivate and train students’ abilities to solve practical problems by using all kinds of learned knowledge and professional skills. It mainly includes the following contents: training students’ ability to retrieve documents, as well as translate, collate and synthesize materials; training students’ ability to analyze and solve problems independently by using the knowledge and skills they have learned; training students’ ability to think independently and carry out professional research independently to acquire new knowledge; training students’ innovative consciousness and rigorous and meticulous work style; training students’ comprehensive skills, e.g. computer application, design and drawing, etc.

So, in the teaching process, the teacher should attend:

- The subject of graduation design must be selected based on the training objectives of the major, meet the basic requirements of teaching and reflect the relevant training content of the major, so that students can get a more comprehensive training.

- The graduation design should set up its tasks according to the actual task or project as much as possible, and place the stress on the trainings of program creativity, data access and comprehensive application of computers for outcome expression in the specific process of design.

- The contents of graduation design should be helpful to the students in the comprehensive application of various theoretical knowledge and practical skills and the cultivation of independent working ability. Their level

![Fig. 2. Course system of architecture major](Photo source: painted by Li Weibing)
of difficulty and volume must be appropriate, so that sufficient work fills in the specified time and students can complete the task through hard work.

- Students should participate in different graduation design subjects in the form of groups, and the teacher must make clear the tasks that each student needs to complete independently and ensure that they can carry out specific and corresponding work according to the regulations, so as to provide each student more comprehensive training and evaluation.

3) Teaching arrangement

a) Selection of valuable subject: In the age of urbanization, more and more cities take on the same look and the traditional villages gradually disappear. The graduates of architecture major should look at the problems from the professional perspective and solve the problems according to the needs of the society in the face of such a phenomenon. Based on these considerations, the graduation design in 2018 ushered in the 15th "Creative Design Activities on National Culture Based on Cooperation between School and Local Government" sponsored by the School of Design, Yunnan Arts Institute which was entrusted by the Chenggong District Government of Kunming City with "Creative Chenggong" graduation design around the regional culture of Chenggong District. The students chose two regions, Wulong Village and Siantaishan District provided by the local government for in-depth group design, which was not only a practical project, but also a hot issue at present concerning rural protection and development and regeneration of the old city. The subject is of practical value and theoretical significance.

b) Emphasis on design process (as shown in "Fig. 3"): The OBE concept emphasizes the learning process of students. The whole design process lasts 18 weeks and is divided into three stages. The first stage is the early preparation stage (the 1st-3rd week); the second stage is the中期 development stage (the 4th-16th week); the third stage is the outcome completion stage (the 17th-18th week)

Stage I: Early preparation stage (the 1st-3rd week)

In the first week, field investigation and analysis were carried out to cultivate students' ability of observation and problem finding. The students went to Wulong Village and Siantaishan District for field investigation. As far as Wulong Village was concerned, three main problems were found. First of all, the traditional buildings, streets, courtyards and water systems were remained in the village, but they lacked diversified functional connotations and characteristics in the integral layout. Secondly, the current buildings and space function in the village were single, lacking of internal attraction and living atmosphere. Finally, although there were many buildings left in the village, they were seriously damaged, lacking of cultural atmosphere. In terms of Siantaishan District, the students carried out investigations by four stages, including data collection and sorting, interview with villagers, questionnaire surveys and field survey, etc.

Through a week of field investigation, the students had a more intuitive feeling on the environment at the scene and a certain understanding of the complexity of environment on site and the rural and urban culture.

In the second week, in-depth investigation and analysis and case study were carried out to cultivate the students' ability to analyze problems. The students analyzed and summarized investigation results based on a week of investigation. First of all, according to the investigations on Wulong Village, the students analyzed and concluded that the difficulty in protecting Wulong Village was a large number of old and damaged historical buildings, which were left unused, in urgent need of repair and a lot of funds and technical support. Moreover, the relocation of villagers might lead to adverse affection on the daily life of ancient villages, the protection and inheritance of folk culture and intangible cultural heritage. In this regard, it is necessary to conduct in-depth study on the strategies of protecting and utilizing Wulong Village and formulate special policies and safeguard measures. Thirdly, through the collection and sorting out of the questionnaires about Siantaishan District, the students analyzed and concluded that the Chenggong District showed obvious old town features and the key traditional buildings were well protected. However, the streets in the old town were crowded and the environment was poor, needing to be improved urgently.

Many times of in-depth investigations deepened the students’ feelings on the environment on site. They fully explored the material and non-material culture at the scene on this basis to form the source of design, and then strengthen their perception and cognition about design through the researches and analysis on similar cases.

Determination of design objective and plan was conducted in the third week to cultivate the students’ ability to solve problems. The students determined the design objective and make a work plan based on the investigations and analysis in the first two weeks, before reading and interpreting the planning of the superior authority. The students determined a relatively clear design objective after carefully reading the relevant documents, e.g. "Notice on Issuing Implementation Action Plan of Historical and Cultural City (Kunming) Protection Planning", "Minutes of Special Session on Conservation and Restoration Projects at Guyu Village in Wulongpu Town", and "Historical and Cultural City (Kunming) Protection Planning (2011-2020)". The formation of traditional village space was influenced by nature, economy, history and other factors, but it was valuable material and spiritual wealth. The "Star Lamp on Fishing River" was one of the eight grand views in the old Chenggong Town, and also one of the most representative scenic spots, reflecting the local folk customs of Wulong Village. Therefore, the design objective became reappearance of "Star Lamps on Fishing River" for the purpose of activating the traditional villages, creating a new rural experience park, and forging the village into a bright pearl by the Dianchi Lake. As for Siantaishan District in Chenggong Town, it was necessary to thoroughly explore and scientifically evaluate the historical and cultural value and characteristics of the old streets. So the design objective was to build a complete protection system for material and intangible cultural heritage, and put forward comprehensive protection and reasonable and sustainable utilization measures.
Stage II: Mid-term development stage (the 4th-16th week)

13 weeks were arranged for this stage to cultivate the students’ design and innovation ability.

Sketch conceiving is arranged in the 4th to 5th week. In this period, everyone kept communicating with each other and exchanging ideas to determine the design subject. Sketch conceiving is a kind of expression of design ability, and inspiration may often emerge suddenly in the process of continuous sketching. Drawing sketch model is involved in sketch conceiving. Various design schemes were conceived for comparison at the beginning. An optimal scheme would be selected from them to deepen after comparison from many aspects, forming the second, third or even more sketch schemes. This is a process for design ideas to gradually grow mature.

Deepening the design scheme was arranged in the 6th to 9th week to cultivate the students’ overall design concept and team cooperation ability. Students should make an overall planning over the whole project, including functional subareas, road traffic system, landscape greening system, etc. The whole planning process needed team spirit. Generally, the team leader led the whole planning and each team member took charge of each subsystem. Any problem must be discussed within the group at first to form unified opinions, and then reported to the tutor for further communication. After repetitious communications among the students, the design scheme became more mature and rational, making the project planning more feasible.

Single building design was carried out in the 10th to 13th week. Single building design belongs to node design and needs the students to exert their independent thinking and creation ability. At this stage, the tutor constantly activated the initiative of students, encouraging them to break through the routine and habitual thinking in previous course assignments as much as possible and make the design innovative. Take Santanaishan planning project as an example. This planning project was composed of 10 functional subareas. The students explored some characteristics of the local mud-wall houses based on investigations on buildings in each subarea, and carried out plane building combination according to the "Yikeyin" architectural combination mode at local area. Mud walls were local unique building materials, so the students decided to use local building materials for reshaping, trying to remain some of the local architectural characteristics. In terms of design of building space, green plants were moved inside to both divide the space and integrate with the environment. As for the facade design, the curving roof corresponded to the trend of the local mountains. The glass corridor, with unique windows and novel shape, not only retained the local architectural type, but also possessed its own innovative elements. The design scheme not only had local architectural features to integrate with the environment, but also reflected sustainable development and innovation concept in architectural design. So the inspiration and subject of this design were reflected as "locality", "greening" and "innovation".

Animation production was arranged in the 14th to 15th week and it was also a reflection of students’ design ability. 3D animation not only enables designers to understand their own designs from all aspects and simulate real scenes to find out the shortcomings in the design, but also makes design works seem more three-dimensional and spacious, so that the viewers can understand the designer's design intent and give their more objective and comprehensive evaluations.

Stage III: Outcome completion stage (the 17th-18th week)

Two weeks were arranged for this stage to cultivate the students’ comprehensive expression ability. Outcome output would be conducted in the 17th week, mainly including design drawings sorting, reasonable layout and display board making. At the same time, three-dimensional solid model should be made so that the whole graduation design could achieve the best display effect, and the tutors and visitors could have a very intuitive understanding of the design intent.

Collective scoring, outcome exhibition and graduation design summary would be carried out in the 18th week. When the graduation design was completed, all major teachers would score the graduation design objectively and collectively via oral defense, communication and discussion. At the same time, the outcome exhibition would be open to the society, and the students would introduce their graduation design works personally to people in different roles, such as local government, design object, employer, etc., greatly improves their oral expression ability. Finally, the students were required to summarize their graduation designs. They reflected on their works and summarized their gains and losses according to the evaluations on their works from the tutors, scoring teachers, local government and employers, etc, so as to make continuous improvements in their future study and work. So far, graduation design curriculum teaching was completed indeed. ("Fig. 3")
Fig. 3. Architectural Graduation Design Process (Photo source: drawn by Li Weibing).
V. CONCLUSION

The traditional graduation design mode based on the teacher's proposition cannot keep up with the concept of modern education. Both the early Bauhaus Education and the current Double Ten-thousand Plan center around students' ability and orient to social needs. Graduation design teaching aims to cultivate and train students' ability to solve practical problems using all kinds of knowledge and professional skills. The graduation design emphasizes centering on students and pays attention to the design process and output, reflecting the real application of OBE concept in the course of graduation design.

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