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## Strengthening of the cultivation of students' business and management ability through higher architectural education against the background of "excellence program"

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### ABSTRACT

Outstanding engineering talents should be equipped with certain business knowledge and good organization and management ability. "A Plan for Educating and Training Outstanding Engineers" which is short for "Excellence Program" implemented by Chinese Ministry of Education and relevant department and industry associations aims to cultivate outstanding engineering talents. Architecture is one of majors which are supported by the plan. Higher architectural education should further impart business and management knowledge into students and cultivate their ability and train the talents with strong comprehensive quality for society. The paper tries to make discussions from two aspects, namely the thought and specific measures of educational reform. The measures include the reform of curriculum system and teaching methods and enhancing the cooperation between industries and enterprises in practical aspect, so as to provide suggestions and reference for universities to cultivate the outstanding engineering talents who meet market demand.

### KEYWORDS

Architectural education; A plan for educating and training outstanding engineers; Business and management ability.



## INTRODUCTION

In June 23, 2010, the Ministry of Education of the People's Republic of China held a kick-off meeting of "A Plan for Educating and Training Outstanding Engineers" in Tianjin and implemented "A Plan for Educating and Training Outstanding Engineers" (short for "Excellence Program") together with relevant department and industry associations. The plan is aimed at cultivating a multitude of high-quality and various types of engineering technical talents who satisfy economic and social development demand with strong innovation ability and offering service for China to take a new path of industrialization and build an innovation-oriented nation and the strategy of reinvigorating China through human resource development. As a member of traditional industries, "architecture" has gained substantial support of excellence program. Actually architecture has always been taken as the pillar industry of national economy for a long time. Related majors include architecture, civil engineering, municipal engineering and architectural equipment, etc. However, it is usually architectural professionals that act as project organizers and the leaders of various majors at the stage of engineering design. At present, the undergraduate education of architecture in China is mostly faced with many problems like the shortage of the learning system of business and management knowledge and the low cooperative ability of students. In this case, the excellence program which aims to cultivate applied talents for market provides an opportunity for the educational reform of architecture at the undergraduate stage.

## THE THOUGHT OF EDUCATIONAL REFORM

### **The current international society's awareness of the education and training of engineering talents**

According to the documents of the Ministry of Education, "Excellence Program" has three characteristics. Firstly, industries and enterprises are deeply involved in the cultivation process; secondly, schools cultivate engineering talents according to general standards and industry standards; thirdly, it is to reinforce and cultivate the engineering ability and innovation ability of students. The three characteristics well indicate that the adjustment of training plan of architectural professionals and the thought of educational reform are in line with the industry to learn what is needed in the industry and comprehensively cultivate engineering practice ability - the ability necessary for engineering, which should be listed in the training objectives of higher professional education.

Similar to "A Plan for Educating and Training Outstanding Engineers" in China, the plan "2020 Engineers" launched by the National Academy of Engineering (NAE) and the National Science Foundation (NSF) in Oct. 2001 also aims to intensify the reform of engineering education, train the engineering talents who meet the demand of 2020, further consolidate and improve the dominant position of America in global competition<sup>[1]</sup>. The first formal report of the plan clearly states that future engineers should be equipped with the following key characteristics, namely analytical ability, practical experience, creativity, communicative competence, business and management ability, moral principles and life-long learning ability. It is worthy of being learned by us that business and management ability is listed in the above characteristics.

### **The problems faced by chinese higher architectural education and reform thought**

The temperature of Currently, the architectural design industry in China is faced with similar problems with other countries. Firstly, the compound talents who are proficient in both engineering technology and business management are deficient; secondly, the organization and management level of design projects is low; thirdly, architectural professionals as the project leaders do not possess enough ability of leading the cooperation among various majors. The ability of engineers can be improved step by step through accumulating experience, but the role played by higher education in laying a foundation should not be neglected. In the traditional undergraduate education system of architecture, most of credits are intensively allocated to the course Architectural Design. Though the courses related to business management are offered, the setting of teaching plan is mostly not appropriate. The whole plan of training talents emphasizes on training design capability instead of organization and management capacity.

The influence of such an unbalance on students is firstly manifested in the aspect of consciousness. The lack of consciousness is usually more serious than the shortage of knowledge. The shortage of knowledge can be made up by life-long learning while the lack of consciousness usually restricts the development direction of people and also determines how far a person will go on the professional road. With the increasing legalization, standardization and marketization of architecture today, the compound talents who can guarantee the sound development of the industry are urgently needed. It can be foreseen that future engineers will find it difficult to keep a foothold and develop if they are lacking in basic business and management ability. The undergraduate teaching reform of architecture is extremely urgent, which should be carried out from curriculum teaching and practical teaching.

## THE MEASURES OF EDUCATIONAL REFORM

### The perfection of curriculum system

Various architectural schools throughout the country have successively adjusted the curriculum system of architecture since 2000. As a result, the credits of the course Architectural Design are gradually reduced and the number of relevant professional basic courses and elective courses is increased so as to expand the range of knowledge and strengthen the comprehensive quality of students. According to TABLE 1, the course Architectural Design, namely “professional core course” only occupied 10.27% of total credits while professional basic courses and professional elective courses together took up 21.21% of total credits from the revised talent training plan of architecture in Chengdu University of Technology in 2013 which supported “Excellence Program”.

Apart from classifying all courses by means of a traditional way of classification, the new talent training plan of the school even implements modular structure and again classifies all compulsory and elective courses and practical link into various knowledge and ability modules. These modules include humanistic foundation, physical ability foundation, a background of science and engineering, art foundation, fundamental graphics, design philosophy, and the classification of architectural design, architectural engineering technology, architectural history, business and management. The same course may appear in the table many times due to its comprehensiveness and being suitable for different modules. From TABLE 2, we can find the classroom teaching courses of business and management knowledge module include Architectural Economy and Construction opened in the seventh semester, Business Knowledge and Project Management of Architects opened in the eighth semester and Architectural Design opened in all semesters. In addition, two intensive practical links are also involved, namely architect business practice in the ninth semester and graduation practice and design in the tenth semester.

“Excellence Program” adopts the method of overlapping knowledge and ability modules based on the traditional classification of curriculum system, which is beneficial to combine specialized courses and ability training objectives, really set courses according to the ability necessary for the future work of students, expand the scope of knowledge, effectively introduce cross-disciplines and enhance the cultivation of comprehensive quality of students.

**TABLE 1 : Structural table of course credits meeting the graduation requirements of architecture**

Course Platform	Course Module	Course	Credit	Percentage in Total
General Courses	Prescriptive Courses	Compulsory	43.5	19.42
	General and Quality Development	Compulsory	10	4.46
Basic Disciplinary Courses	Basic Courses in General Discipline	Compulsory	48.5	21.65
	Professional Core Courses	Compulsory	23	10.27
Specialized Courses	Professional Course Courses	Compulsory	37	16.52
	Professional Elective Courses	Elective	10.5	4.69
Elective Courses	Public Elective Courses	Elective	4	1.79
Intensive Practical Link	Periodic Training of Academic Year	Compulsory	11.5	5.13
	Graduation Comprehensive Training	Compulsory	36	16.07

	Compulsory	209.5	93.53
Total	Elective	14.5	6.47
	Total	224	100.00

**TABLE 2 : The structural table of knowledge and ability module to corresponding professional curriculum of architecture**

Knowledge and ability module	Corresponding curriculum	Corresponding practice
Humanistic	Various ideological curriculums, English	
Physical ability foundation	Military Training, PE	-
Science and engineering	Advanced Mathematics, Mechanics	
Art foundation	Pencil Sketch, Water Color, Elementary Architecture	Arts practice
Drafting foundation	Shadow and Perspective, Architectural Drawing Science, Elementary Architecture	Practicing architectural cognition
Design theory	Principles of Architectural Design, Fundamentals of City Planning, Principles of Interior Design, Principles of Landscape Design, History of Chinese Architecture, History of Foreign Architecture	Practicing architectural cognition
Architectural design	Various curriculums on architectural design	Architect business practice, graduation practice and design
Architectural history	History of Chinese Architecture, History of Foreign Architecture, Architecture Sect, Study on Traditional Architectural Culture, Architectural Heritage Protection	Practicing ancient architecture measurement
Architectural engineering technology	Building Materials, Architectural Construction and Design, Architectural Structure, Architectural Physics, Architectural Equipment	Site practice
Business and management	Architectural Design, Building Economy and Construction, Professional Knowledge and Project Management for Architects	Architect business practice, graduation

### Reform on teaching methods

It is fundamental to perfect the curriculum system for teaching in a proper manner. This guarantees the ways to impart knowledge. While reform on teaching methods shall be the starting point to improve the students' business and management awareness and ability effectively and continuously. Teaching design shall be made from the perspective to cultivate the students' ability really and the proper teaching methods shall be adopted. Several following transitions shall be emphasized. Firstly, teaching professional theory curriculums can't be limited to imparting of some basic concepts. Teaching shall take the ability cultivation objective into account. For example, the students are required to some important economic concepts in Building Economy and Construction. But more emphasis shall be laid on the economy and evaluation of the construction project<sup>[2]</sup>. The teacher teaching Professional Knowledge and Project Management for Architects shall not only introduce the project's capital construction procedure but also emphasize discussing the project management system and its operation<sup>[3]</sup>. The teachers shall target at the ability appeal for students. Secondly, the research-based learning methods shall be promoted, namely the question inquiring learning method, the case discussing learning method and the project participating learning method<sup>[4]</sup>. Specifically, the teacher shall give lectures by fully combining with the real projects. This can visualize the abstract terms. The students can experience how to operate the project in person and realize the required ability for engineering. Teaching transits from the superficial knowledge imparting to ability cultivation. Thirdly, the other curriculums in the same module shall be the support to improve the students' business and management ability in multi ways. From TABLE 2, beside two professional theory curriculums, there is Architectural Design in Business and Management Module accounting for 10.27% of the total credits. If this series of

important curriculums arranged throughout are fully utilized, the students' ability can be greatly improved. The architectural design of each type has several stages from the teacher entrusting assignment, the students accepting assignment, comprehending assignment book, presenting the solution, reporting mid-term and final outcomes. This process stimulates the market operation mode of the construction project. As for curriculum teaching, firstly the process shall be strictly controlled, the assignment shall be well comprehended at the early stage, the later period shall be clear stage by stage and the outcomes shall be definite to be reported. Secondly, it is considered to introduce bidding mode and group work mode into senior class teaching. This is to stimulate market operation from the teaching stage really and improve the students' mass collaboration as well as organization and management ability. Teaching Architectural Design in such manner provides a good support for teaching relevant theoretical curriculums.

### **The cooperation with industries and enterprises in practice**

It is critical to cooperate with industries and enterprises closely to cultivate highly-qualified engineering talents. Because enterprises can provide real environment for engineering practicing and innovation and possess a lot of experienced front-line engineering technicians, enterprises know the requirements for engineering talents for economic and social development best<sup>[5]</sup>. The architect business practice for students in architecture major at the ninth semester is the traditional way colleges and universities cooperate with enterprises. From the former situation, colleges and universities make enterprises to master project content and practice quality of students always. The practice reports are to be accepted at the final stage only. During practice, the students are off-campus and not instructed by teachers completely. This may lead to the pointless practice and miss the ability cultivation objective. Business and management ability is one of the important objectives to cultivate during practice. If the students have no effective instructed assignment, this objective shall not be achieved. Therefore firstly, colleges and universities shall give out clear assignment instructions for practice. Although enterprises provide the design projects, colleges and universities shall limit the type of assignment to some extent. For example, the proportion for students to participate the project design at early stage and the construction drawing design at the later stage can be provided in the assignment book, the same is true for the mode of group cooperation. Secondly, besides submitting the practice outcome of traditional drawing report, the students shall also reflect and summarize the whole practice process, especially the operation of the design projects and the students' participation to submit the written practice report. Thirdly, the practice outcome shall stress comments of enterprises and colleges and universities together. Colleges and universities shall provide the detailed evaluation contents and standards for enterprises. The standards shall be established as per the ability cultivation objective for students strictly, including the business and management ability cultivation objective.

### **CONCLUSION**

In the present age, beside the technical competence, business and management ability is also one important index to evaluate a qualified architect. All engineering projects relate to business activities and management. At the regular higher education stage, it is assignable to strengthen to cultivate the business and management ability of the undergraduates in architecture major for educational reform on architecture. This is to implement "A Plan for Educating and Training Outstanding Engineers" and an important way to cultivate talents who meet market demand. In order to strengthen to cultivate the students' business and management ability, it is considered to conduct educational reform from classroom teaching and practical teaching. The current teaching system and teaching methods shall also be reflected. The excellent building talents meeting the market demand can be cultivated via reform on three aspects of curriculum system, teaching methods and cooperation with industries and enterprises in practice.

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