

Chapter 141

Discussions on the Curriculum Integration of Architectural Technology and Design

Jin Zhang

Abstract In the wake of the flourishing development of construction industry in China, an increasing number of graduates majoring in architecture are needed in the market. However, an apparent discrepancy between education and the reality exists: numerous graduates couldn't assume the responsibility of independent design until they have gone through a quite long period of time for adaptation, which is, as demonstrated in this paper, correlated with the current disjunction between the architectural technology and design education. The reasons for this phenomenon have been analyzed in this paper; and based on the analysis, strategies for the curriculum integration of architectural technology and design have been proposed.

Keywords Architectural technology · Architectural design · Integration

141.1 Introduction

In the wake of the flourishing development of construction industry in China, an increasing number of graduates majoring in architecture are needed in the market, and the newly-founded domestic architecture specialties are constantly springing up. Then, are the current graduates majoring in architecture able to meet the demands made by the market? The answer is not optimistic. Numerous graduates couldn't assume the responsibility of independent design until they have gone through a quite long period of time for adaptation and have received one-year or longer-period reeducation in design institute.

J. Zhang (✉)

School of Architectural Engineering, Zhongyuan University of Technology,
Zhengzhou, Henan, China
e-mail: ccqaa2005@126.com

141.2 Current Situation of the Architectural Technology and Design Education in China

Through years of teaching practice, one point which can be affirmed is that the discrepancy between education and the reality is correlated with the current disjunction between the architectural technology and design education. Along with the rapid social development and scientific improvement, the practical engineering technicality has turned into far more complex while the settings of technology curriculums in architectural major are dramatically laggard. Even worse, as such crucial technology courses in engineering practice, they should be seriously neglected. Obviously, the reason why architecture majors who possess severely inadequate architectural technology knowledge lay less emphasis on technicality than art is that the architectural design has been artificially dis severed from the technology courses (Qin 2002). The architectural design is the main required course throughout the five-year professional learning of architecture, which has been attached great importance by both teachers and students. However, only the graphic design and the deliberation for the architectural image are stressed in the traditional architectural design education. Meanwhile, the great support provided by architectural technology for architectural design has been ignored. Especially in some newly-founded architectural colleges, there are only two highlighted subjects—form and function from the basis of architectural design to the graduation design owing to reasons in various aspects like the field of vision, teacher resources and the traditional teaching mode etc., which would lead the students to get a one-sided understanding of “architectural design is the combination of form and function” and then pay little attention to the architectural technology curriculums that provide great support for architectural design. Thus, for lots of students, failures and mistakes would be constantly showing up because of the lack of sufficient knowledge about engineering technology (Chang 2004).

141.3 Causes for the Absence of Architectural Technology Education

141.3.1 The Absence of the Atmosphere in Architectural Technology Education

Under the profound influence of “French Beaux Arts”, the architectural design more focuses on the artistic expression in domestic modern architecture education. After decades of inheritance and evolution of this conception, architectural performance has become an important criterion for judging the grades of the students’ assignments. The beautiful rendering and the awesome architectural image are the factors of obtaining the teachers’ favor and schoolmates’ admiration, as well as the methods to achieve a good grade on the assignment (Zhang 2011).

This conception has been strengthened by the social atmosphere. Particularly in the design of multitudinous image and priority projects, the so-called “not outdated even thirty years later”, “modernized” and “magnificent” would be eventually reflected in the brilliant rendering, which has made the architectural image be the key standard or even the only standard in some occasions to decide whether the program is a success. “Architects of renderings” have been favored by the whole society.

At the same time, with a small proportion of course credits, the architectural technology curriculums are regarded as “minor subjects” by students who make light of the courses and only expect to pass them without much endeavor. Affected by this atmosphere, most students are inclined to lay more emphasis on art than the technicality, sparing no effort in searching for the materials to pursue the magnificence of the architectural image (Wang and Zhou 2004). Without any realization, they keep the same attitude of opportunism and imitation in the practical work and couldn't be flexible in the practical engineering situations. With the profound habitual effect, this atmosphere has been spreading and extending in some new architecture colleges to a certain degree.

141.3.2 The Absence of the Curriculum Integration of Architectural Technology and Design

At present, the undergraduate education of architecture have set up many courses for architectural technology, such as architectural construction, architectural structure, architectural physics, architectural equipment, building material and so on. However, these courses are not considered as the significant part inseparable from the architectural design curriculums. Teachers of different courses are just absorbed in independently accomplishing their own part of job on the educational stream line with little connection, not to mention the part-time interdisciplinary teaching (Ji 2000). As a consequence of this teaching mode, students wouldn't be able to timely realize the essential supportive value the architectural technology owns specific to the architectural art at school, ignoring the positive application of the architectural technology knowledge during the classes; and moreover, most have forgot all the architectural technology knowledge learned in earlier semesters when they are going to graduate in fifth grade. This bad result is vividly reflected in the low passing rate of architectural equipment, architectural structure and building material in licensing examination for architects.

141.3.3 The Absence of the Course Practice of Architectural Technology

As the architecture is a subject with strong practicalness, only by turning knowledge and education into sufficient practical use could the students deepen

their comprehension of knowledge and then improve their design ability. For the moment, students in most architecture colleges and departments seem to have a relatively long internship of one semester in practice institute which is arranged by the universities or searched by students themselves. However, the actual situation is not optimistic—considering the economic interests and work efficiency, few practice institutes are willing to allow the “green hand” to participate a decent engineering design. What the interns do are trifles and the excellent architects do not have enough passion and time to explain the technical problems students have met in designing process. The design institutes, which have a better knowledge of how to perfectly combine the architectural technology and art compared with the universities, actually could not provide the students with sufficient technical practice and an opportunity of comprehension within the short term.

The timing for the internship is also a factor for weakening the practice’s sound effects because the internship is always arranged at the fall semester of the fifth grade which is just a critical period of the annual exams for postgraduate schools review. Enduring double pressures of preparing for the postgraduate exam and seeking jobs, plenty of students forwardly give up the god-given training opportunity in undergraduate stage, which indicates that there is no actual practice training of architectural technology in most architecture colleges (Li 2007).

141.3.4 The Absence of the Teachers’ Practical Experience and the Teaching Openness

In china, the education background has been attached remarkable attention by the public, especially by the teaching staff in universities. While as a quite stable profession under the current situation of unprecedentedly high employment pressure, being a teacher in universities is more attractive for most people. Therefore, an increasing number of highly-educated talents with only book knowledge instead of practical experience ascend to the universities’ platform, which has brought a big hidden danger to the architecture teaching which possesses strong practicalness and led to a bad teaching effect of architectural technology—with insufficient practical experience and backward textbooks against the social improvement, these young teachers couldn’t offer students more updated technology knowledge to support the designing idea or even are not able to answer the questions students are confused about.

Meanwhile, as the teachers’ payment is not comparable to the professional architects’ salary, the excellent professional architects show little enthusiasm for taking part-time classes in universities. Particularly in some newly-founded architectural colleges and departments, teachers with rich practical experience and enough opportunities of external exchange are badly needed, which has a profound influence on students’ ability to effectively obtain the architectural technology knowledge associated with the advances of society.

141.4 Strategies for the Curriculum Integration of Architectural Technology and Design

The separation between architectural technology and design is a critical cause for the absence of the architectural technology in current architectural education. Through years of teaching experience, the conclusion can be drawn that the curriculum integration of architectural technology and design needs to be implemented from three aspects: teaching resources, textbook system and teaching steps.

141.4.1 Strengthen the Reconstruction of Teaching Staff by Various Measures

Teachers are organizers of the classroom teaching, and what the level of their professional skill is profoundly affects the realization of teaching objectives with high qualities. Thanks to the one-sided pursuit of teachers' education background in many domestic colleges, an increasing number of highly-educated talents with only book knowledge instead of practical experience ascend to the universities' platform, which has brought a big hidden danger to the architecture teaching which possesses strong practicalness—with insufficient practical experience and backward textbooks against the social improvement, these young teachers couldn't offer students more updated technology knowledge to support the designing idea or even are not able to answer the questions students are confused about; most of them just take the technique difficulty as a valid reason for the slaying of students' creative thoughts (Liu and Tian 2009). The following measures can be taken to raise the teachers' teaching level: (1) Promote the intercollegiate exchange at home and abroad. It's preferable for universities to strategically send front-line teachers to renowned colleges to conduct the lecture investigation, obtaining the advanced teaching experience, which would be surely a great help for rapidly enhancing teaching standards in new architecture schools. (2) Establish the long friendly linkage system between universities and design institutes. To improve the design ability and technical level of teachers and students, the activities of practical design and research shall be frequently initiated. (3) Invite the architects in design institutes to participate the teaching of architectural design course, bringing the advanced technology knowledge and designing idea outside of the textbook to students. (4) Often invite the well-known experts and architects outside the college to give lectures to make up for the deficiencies of young teachers' practical experience and technical skills.

141.4.2 Strengthen the Reconstruction of Textbooks, Setting up the Reference-Book System

Following the rapid social development and dramatic advances in technology, the new structures and materials are continually emerging, which leads to the constant ideas expansion on the architectural design. Nevertheless, with old and backward content against the practical engineering, the architectural technological textbooks in universities update information too slow to keep pace with the times, which couldn't satisfy the students' needs for learning architectural technology knowledge (Feng et al. 2011). In fact, the textbooks that have a thorough analysis and explanation on architectural image, space, technology and some other aspects are particularly scarce. Therefore, the reconstruction of textbook system shall be strengthened, taking the architectural technology as a key chapter added into the architectural design textbooks. The textbook shall be regarded as the bridge for the integration of architectural technology and design which would be favorable for students to build up the all-sided and open concept and the correct designing idea.

Besides, abundant reference books on architectural design could effectively avoid the defects existing in current textbooks. Based on the principles of "from the elementary to the profound" and "step by step", the reference books shall be complete, comprehensive and multilevel. As the reading materials after class, the reference books play a significant role in expanding the students' scope of knowledge about architectural technology and design and enhancing their professional competences.

141.4.3 Strengthen the Lateral Linkage Between Curriculums with Equal Attention Paid to the Classroom Teaching and Practical Activities

The execution of the teaching program shall be properly adjusted to make a timing fit for the courses offering of architectural technology and design as well as to strengthen the lateral linkage between curriculums, forming a teaching system mainly based on the architectural design with supportive cooperation of architectural technology causes (Ju and Ma 2009).

For instance, in the architectural construction cooperated with design courses, the theory lessons shall be given in the form of "designing first and lecturing second" instead, which can be planned form several subjects like stair construction, roof construction and wall construction etc.; meanwhile, in design classes, the students should be required to draw the architectural plan in depth and then make corresponding construction samples, which would help students with the application of architectural construction knowledge in designing process. In addition, as the architecture is a subject with strong practicalness, the training through practical engineering would enable students to preferably realize the architectural

technology's strong supportive effect on the design (Baniassad 2001). Thus, it's definitely necessary to take the practice as the beneficial supplement of classroom teaching. Besides, maybe it's wise to prolong the training period to the whole year of fifth grade and allow students to do exercises and accomplish the graduation design under the joint guidance of teachers and architects in design institutes, which would bring the internship into teachers' effective management and guarantee that there is enough training time for students to greatly improve the practical ability and vividly realize the close relationship between the architectural technology and art.

141.5 Conclusion

Architecture is the combination of technology and art. The two aspects are linking closely with a complementary relationship. Correspondingly, the curriculum integration of architectural technology and design would help students with both the cultivation of artistic ability and the training of architectural technical skills. Only in this way could the graduates possessing independent working ability with profound artistic accomplishment and engineering knowledge be cultivated to meet the demands that the China's booming architectural industry have made on architects.

References

- Baniassad E (2001) Sustainable Design Education. *ACSA NEW* May:2001:5,10,11
- Chang Q (2004) Trends in architecture education reform of Tongji university. *Time + Architecture* 6 (in chinese)
- Feng J, Ding M, Zhuang C (2011) A good carpenter sharpens his tools first: discussions on teaching integration of architectural design and technology. *Huazhong Architect* 06 (in chinese)
- Ji Y (2000) Suggestions on the technical quality cultivation of architecture majors in China. *Architect J* 6 (in chinese)
- Ju W, Ma L (2009) Strengthen the teaching relationship between technology curriculums and architectural design courses. *Huazhong Architect* 07
- Li X (2007) Teaching practice and comments on architectural design emphasizing architectural technology as the source of conception. *Anhui Architect* 4 (in chinese)
- Liu S, Tian W (2009) How architectural technology is expressed by architectural design. *Ind Architect* s1
- Qin Y (2002) Introduction to the architectural technology. *Archit J* 7 (in chinese)
- Wang X, Zhou T (2004) An exploratory study on the architectural technology integrated with architectural design: a case of school of architecture and urban planning in Chongqing university. *New Architect* 4 (in chinese)
- Zhang J (2011) An exploratory study on performance and strategies of the absence of architectural technology education. *Educ Vocat* 4 (in chinese)