Reform and Exploration of Practice Teaching in Architectural Drawing

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Abstract: Architectural Drawing is a technical basic course having strong practice function. Drawing architectural designs is an important part of its practical teaching. According to the characteristics of architectural drawing, the article proposes the corresponding reform measures for practical teaching problems from the three aspects of basic skills training, physical space perception and building surveying and drawing training. Good teaching results are obtained, and teaching reforms increase the level of curriculum construction.

Keywords: Architectural Drawing, practice teaching, teaching reform, engineering quality

1 Introduction

As the carrier of human cultural knowledge, pattern is an important tool for information dissemination. Architectural Drawing studies the theory of pattern and its application on the field of construction engineering design, which not only is an indispensable technical language for building technology but also is a leader in building design and construction and the basis of architectural culture. Based on the range of professional courses and basic courses, Architectural Drawing has the technical characteristics of professional courses and the common nature of basic courses. Its main task is to train students’ ability in the image thinking and to make students understand the basic concepts of housing construction, and students can read and draw the construction drawings by studying this course. For construction engineering students, Architectural Drawing is a very practical course because on the one hand they are required to understand and master the standards of architectural drawing; on the other hand they must improve their communication skills and their ability to express the construction through the basic training in terms of reading patterns and drawing. It is very important to train students’ practical engineering capabilities through strengthening the practical teaching.

2 Current Situation of Practice Teaching

Over the last decade, with the development of modern science and technology hardware and software environment in teaching is continually improved and enhanced. Although there are a series of reforms about course content, teaching methods and means, these reforms are carried out around the teachers. In other words, “teacher-centered” teaching model has not changed, which is the root cause of no breakthrough in teaching effectiveness. Students trained in this teaching mode feel hard in learning main courses and their ability is weak in reading and drawing patterns. The reason is that inflexible teaching method, single teaching form and stereotyped question leave students to think independently, a very narrow space to independently study and to innovate. It is difficult to inspire students’ interest in learning and to play an important role in creative education for Architectural Drawing [1].

Now the practical teaching method of Architectural Drawing in most institutions is that on the basis of the teacher lectures, students do some exercises on reading and drawing patterns by doing problem sets related topics. Drawing training is to draw patterns with computer or drawing instruments, including: basic exercises, draw plane figure, draw assembly view, draw a variety of profiles and sectional drawings, and draw the case diagrams of construction drawings and structural drawings. Picture stories training includes basic training and professional training. Basic training is carried out mainly through making the third projection by two, complement and correction exercises of profiles, which aims to
training students’ spatial imagination and logical thinking ability. As for the training of professional plans, it is realized by drawing the case diagrams of construction drawings and structural drawings. In practice teaching, some knowledge points can be mastered through drawing patterns, such as: the composition of plane figures and the connections between segments, the three-plane projection and dimension of combination. The simple form expression and idea training can be achieved by doing a certain number of exercises. The professional graphics part, since it has large and complex content which involves a lot of professional knowledge and drawing standards, it is difficult to train students’ expression and understanding ability of architectural form by drawing the case diagrams of construction drawings and structural drawings from problem set.

Learning theory of constructivism holds that the development of learning depends on people’s original cognitive structure. Since each learner has their own cognitive structure and experience in the real world and different learners may have different understanding and experience, the result is that for some learners the information obtained from learning does not correspond with the real world. In learning new knowledge, the learner will transform the information from individual experience to new knowledge into his own internal representation. Individual knowledge acquisition comes from the interaction between the individual learner and the external environment. Knowledge of the outside world not only can assimilate into the original cognitive structure, but also can change the existing cognitive structure through the hue mechanism. This indicates that the process of acquiring new knowledge is on the basis of the existing cognitive structure, while students can get the better understanding of the original cognitive based on new knowledge [2].

Architectural Drawing is always opened in the freshman year. For students recently promoted to university, because they lack engineering consciousness and experience, so their knowledge and understanding about buildings is in vague stage, and they don’t know the components, construction of building and even the name. For the above reasons, it is difficult to train students’ expression and understanding ability through drawing the case diagrams of construction drawings and structural drawings from problem set. The actual process of practical teaching is: most of the students mechanically imitate, do not know the expression or even the meaning of the patterns they draw. The result is that teaching effectiveness is far from satisfactory resulting in more errors in subsequent curriculum designs. Major errors are: (1) building drawings do not meet the standards of Architectural Drawing; (2) the expression program of building is unreasonable and the target is not clear; (3) expressions of building handled badly and more errors in the pattern; (4) the lack of detailed understanding and cognitive of building components, design divorced from reality. In the process of training qualified construction professionals, training students’ ability of drawing and reading patterns is a vital part of practical teaching. Changing the teaching ideas, reforming the current teaching practices, reinforcing the combination of curriculum content and practice are the urgent priorities. To solve this problem, we must reform the current practice of teaching.

3 Reform and Exploration in Practice Teaching

Reforming the existing practice teaching is not to totally negative the original teaching model, but to further improve the existing practical teaching model based on absorbing its reasonable part and combining the requirements of practice syllabus and students’ actual cognitive level.

Architectural Drawing is a practical course which has not esoteric theory and formulas needed to memorize. It is not hard to understand the classroom lectures and the examples. But to better explore the idea of students so that they can understand and master the content of this course and have better spatial imagination, problem solving ability and graphic expression skills, it requires teachers to analyze various kinds of questions and inspire students to develop spatial concepts by explaining the exercises. And in order to improve students’ practical ability, teachers may guide them to observe and analyze the architectural forms around, to draw patterns by hand, to make combination model, to read engineering drawings and other aspects [3].
3.1 Strengthening basic skills training
At present, in design institute computer graphics has already replaced the previous drawing method, such as manual drawing and blueprint. For students learning computer graphics, it is very necessary because they will use it in the future work. Under such conditions, what is the practical aspect of drawing by hand necessary? The ancients said, “Do not read without writing”, which means that writing can enhance the understanding of learning objects. The practice shows that it is very difficult to correctly understand the engineering drawings and master drawing standards and correct drawing methods without hand-drawing training. Hand-drawing training plays an irreplaceable role in training and strengthening students’ basic skills of reading patterns and drawing patterns. Hand-drawing includes freehand drawing and equipment drawing. With the development of computer graphics, hand-drawing and computer graphics come into complementary aspects. Freehand drawing is a kind of basic skill which is often used in engineering surveying and exchanging design ideas. Therefore, freehand drawing training becomes an important aid in design with a very strong vitality.

During the practice teaching, the idea of strengthening basic skills training is that freehand drawing and equipment drawing are of equal importance. From basic exercise to design drawing, students must draw freehand sketches before drawing instrument patterns to train the capacity of visual and hand drawing. Through repeated training, not only guide students to strictly abide by the national drawing standards in the process of reading and drawing patterns, but also strengthen the normative sense to develop students’ rigorous and meticulous, serious and responsible working attitude and work style, so that they can become qualified technical personnel[4].

3.2 Training students’ spatial thinking and engineering capabilities
3.2.1 Guide students to accumulate the cognition about space form based on basic body and combination.

The basic body includes prism, pyramid, cylinder, cone, sphere, etc. In the teaching process, teachers gradually guide students to observe these basic bodies, and lead them to master the projection features of point, line and surface on the basic bodies and how to determine their mutual position. Basic bodies can be combined to form a variety of complex combinations according to different requirements. The accumulation of knowledge about space form is the basis for the formation of spatial concepts. In practice teaching, the approach is to make three-dimensional models based on the views of combination. Specifically: select some three-plane projections of more typical, representative combinations, and lead students to analyze the projections and to make models by hand. Through a certain amount of model-making, the cognition of space form is strengthened and body image library in the minds of students is formed. In this way, it not only makes students more clearly understand the form and connection of combination but also activates students’ spatial imagination which makes space form and its projections form clear image in the mind of students. So students can build good perceptual cognition and accumulate the materials for the future design concept and configuration.

3.2.2 Guide students to understand the structure and expression of building through contrast with actual building by contrast with its full set of construction plans.
Cognition and expression of building structure is the key to the practical teaching. Cognition of building includes macro and micro levels. Macro level means to understand the basic knowledge structure of architectural design. From the micro level, cognition of building especially means the basic knowledge about building structure, building construction, major building components and construction materials. Training in this aspect can be done by mapping, drawing and making model with class lecture [5]. Comparing patterns with actual objects is a good way to practice teaching. Specific practice is: collect the construction plans of various campus buildings, and in the construction site treated as second classroom, guide students to carefully observe the buildings compared with corresponding patterns. By comparison, students enable to understand the features of building structure and the expressions of all kinds of working drawings, and buildings, working drawings and architectural expressions are closely related to each other in the minds of students. Finally, draw the related patterns of construction drawings.
and structure drawings to master the methods of drawing construction plans.

3.3 Strengthen the training of mapping building, train students’ engineering quality
Mapping training is an important part to encourage students to integrate theory with practice, apply their knowledge in life and improve their overall engineering quality. The so-called “engineering quality” is the sense of solving engineering problems, is the overall performance of engineering and technical personnel’s knowledge and ability. It is required that they not only have a more solid basis of engineering theory and practical knowledge, but also have wide range of knowledge, open mind and good links between different disciplines, which make them have innovative ideas that can be implemented. Engineering and technical personnel must have good engineering quality which includes four main aspects: more solid technical knowledge, necessary training in engineering practice, having the ability of analyzing and solving practical engineering problems and adapting to more difficult working environment.

During the process of practice teaching, creating project environment plays a very important role in improving students’ interest in learning and making students self-improve. If teachers teach only theoretical knowledge and students lack the training of improving practical ability, students will not have the basic engineering awareness and design capability, and especially the training of engineering quality is bound to fail.

In order to enable students to systematically master the knowledge points through mapping training and skillfully apply the knowledge in production practice, in accordance with the requirements of course outline, first compile a set of more complete housing construction surveying and mapping instructions which covering the all contents of course outline, and then select more flexible self-mapping design patterns according to the actual situation. In practical teaching the method we have taken is: students form cooperative groups defining a quarter as a unit and respectively measure dormitory, office, canteen, sports and other campus buildings, and draw the buildings’ floor plans, elevations and profiles following “mapping is the main, design is secondary”; then, self-assessment, peer assessment, team correction and teacher assessment are carried out in accordance with the scoring criterion of housing construction surveying and mapping instructions. Building surveying and mapping training not only exercise students’ practical ability, expression and collaboration capability, but also encourage students to carry out small improvements to the building patterns, so that they enable to experience the success of innovation.

4 Conclusion

The reform of practice teaching in Architectural Drawing trains students’ capacity, technique engineering quality and other non-intellectual factors. It is reflected in the following aspects: student’s image thinking, spatial imagination and thinking ability are significantly enhanced; student’s ability of expressing architectural forms using engineering graphics theories is greatly improved; student’s self-learning ability, independent capacity for knowledge and innovation have been trained; it trains students' self-awareness and sense of mutual cooperation as a team and so they initially develop rigorous and meticulous work style.

References

[3]. SAWULET Bekey. Teaching Practice on Civil Engineering Drawing Courses. Journal of
