Reform of the Blended Teaching Mode in the Course of "Architectural Drawing and AutoCAD"

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Abstract

With more and more applications of the electronic, computer, and information technologies in the field of education, the modes of traditional teaching are now changing gradually. Blended teaching mode, a new teaching mode combining both the online and offline teaching modes, has currently become the trend in teaching modes in the scope of higher vocational education. Taking the course "Architectural Drawing and AutoCAD" for particular, by studying and analyzing the applications of the blended teaching mode in the course, it is found that it does have achieved ideal effects on improving the teaching quality of the teachers and learning efficiency of the students according to the statistics from the national resource bank and MOOC platform.

Keywords

Architectural Drawing; AutoCAD; Reform of the Teaching Mode; Blended Teaching Mode.

1. Introduction

With continuous overall improvement of the level of science and technology in our country, more and more specific technical means have been developed and adopted in various industries to achieve actual advances in the corresponding fields. The industry of architecture has also achieved breakthrough progresses by improving the level of the corresponding technologies in the industry. To further meet the requirements of the architecture industry as it develops and progresses, architecture companies have also begun to take more seriously the combination of architectural AutoCAD as well as engineering drawing and graphics recognition during the actual construction processes. This has become an inexorable trend in professional operation of the architectural engineering. To further realize the functions of architectural AutoCAD as well as engineering drawing and graphics recognition in the architecture industry, it requires the corresponding vocational colleges to pay more attention to the actual teaching situation of the corresponding courses such as "Architectural Drawing" and strengthen the combination of architectural AutoCAD and engineering drawing. This may train out more high-quality talents needed in the development of architecture industry and can further promote the subsequent advances of the architecture industry [1].

2. Current Teaching Situation in the Course of "Architectural Drawing and AutoCAD"

"Architectural Drawing and AutoCAD" is a course mainly on teaching students to draw graphics through the conversion of three-dimensional graphical information into two-dimensional graphics. The content of the course is rather abstract and so that difficult for the students to understand. It requires the students to have certain ability of spatial imagination. In traditional

teaching mode, the teaching of the software AutoCAD is separated into two forms of independent teaching, graphics recognition and teaching of the software AutoCAD, respectively. However, this may ultimately lead to students' insufficient ability in learning the graphics recognition and inadequate time to learn the operation of AutoCAD software. Therefore, it becomes a great concern for the teachers in teaching the course of "Architectural Drawing and AutoCAD" such as to reconstruct the teaching content and reform the teaching mode of this course.

2.1. Students' Low Learning Efficiency in Graphics Recognition

Generally, the mode of traditional teaching is carried out in a classroom or a computer room equipped with a multimedia computer and a projection screen. The projection screen was used to show the students the teacher's instructive operations in the multimedia computer. Meanwhile, the students follow the teacher's instructions and repeat the operations and/or learn from the instructions in the textbook if necessary [2]. By this traditional mode of teaching, the students' drawing ability and sense of space may not be exercised adequately. They may not clearly understand the accurate concepts demonstrated in engineering drawing. When the class is over, the students may be only able to repeat the operations by recollecting those the teacher had taught in the class. This not only requires the students lots of time to repeat the operations, it may also in turn reduce the students' learning efficiency.

2.2. Students' Inadequate Time in Learning Software AutoCAD

The contents of the course "Architectural Drawing and AutoCAD" include: basic drawing knowledge, architectural graphics recognition, AutoCAD drawing, and Tagent architectural drawing. So there have already been many teaching and learning contents in this course. Consequently, after the students learned the basic knowledge of drawing, they may forget it when they start to learn architectural drawing using AutoCAD. So, they may have not enough time to learn AutoCAD and practice it. As a result, the teacher cannot set the difficulty of the course too high for the students to learn.

2.3. The Lack of Learning Resources

At present, the knowledge of architectural engineering drawing in libraries and online learning resources and AutoCAD commands to draw books or teaching videos, and the use of AutoCAD to accurately draw architectural engineering drawings are very few teaching materials. College textbooks are often biased towards theory and few specific operation examples. In teaching practice, most colleges and universities simply choose a textbook, making the teaching process too "bookish" and lacking "earthly spirit". As a result, the knowledge reserve is derailed from the engineering practice, and it deviates from the ultimate goal of teaching, that is, what is learned is not used.[2]

2.4. Insufficient Initiative in Learning

In the classroom teaching process, the teacher usually talks to the teacher. Most students do not have the opportunity to actively participate in the teaching process, more innovative thinking is not shown, and even the knowledge points that have not been learned will not take the initiative to ask questions. As a result, there is a lack of interaction between teachers and students, failure to understand in class, and failure to learn after class frequently occurs, and students cannot review the knowledge and skills in class well. If this is the case for a long time, it will reduce students' interest in learning and make them lose their confidence in the course.
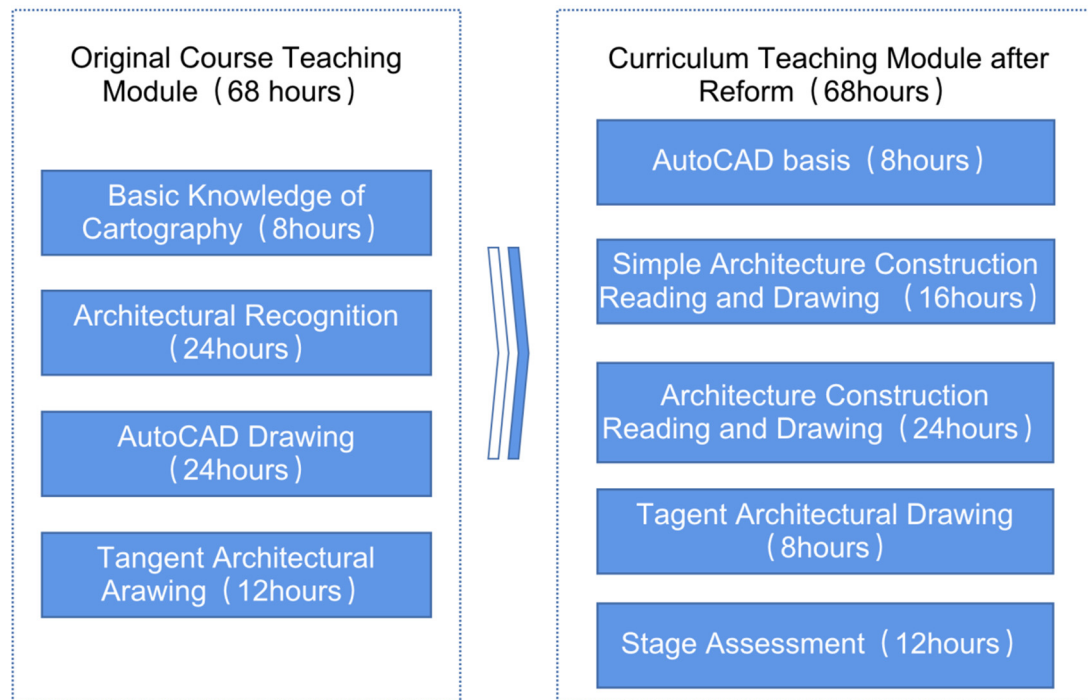
3. Content Reconstruction of the Course

Fig 1. Reconstruction diagram

3.1. Removing Point, Line and Surface Knowledge Modules; Reducing Three-view Knowledge Module

In order to better focus on the learning objectives, the learning content of the three views is reduced, and only the parts that are closely related to the construction drawings are selected. in the previous teaching, the effect of point, line and surface projection knowledge on later construction drawings was not obvious. In addition, most students have already laid a good foundation in high school, so currently only one project is left as this part of the knowledge point to review and consolidate.

3.2. Merging the Contents of Graphics Recognition and Autocad Drawing

As a technical software, AutoCAD needs to abide by its technical specifications when drawing construction engineering, to ensure the effectiveness of drawing drawings and optimize the quality of construction engineering design. To make better use of AutoCAD technology for architectural drawing, not only the support of relevant departments, but also the assistance of modern technology is needed. The use of diversified scientific and technological means to achieve precise extraction of data required by units or individuals, forming a relatively automated framework system, while ensuring the accuracy of building data information, lays the foundation for architectural drawing. Architectural drawing requires high practical experience and spatial logic ability of the staff. It is necessary to be proficient in drawing instruments and measuring instruments, and to control the clarity of the drawings drawn. at present, the level of drawing design of architectural engineering in my country is constantly improving, and strict requirements are also placed on the expression and completeness of architectural drawings. It is necessary to comply with AutoCAD drawing specifications and basic principles of drawing, to realize the integrated application of architectural AutoCAD software in architectural drawing work.[3]

3.3. Enhancing the Difficulty in Autocad Reading and Drawing of Construction Drawings

Many current courses explain the basic knowledge of architectural drawing in great detail, but do not involve the more difficult construction drawing reading; AutoCAD has always only learned basic commands. After learning, students still don't know how to use these basic commands to draw complex construction drawings. After the teaching reform, carry out construction drawings for project-based teaching design, integrate AutoCAD commands into project teaching, and integrate complex drawings It is broken down into several simple steps to facilitate students to read and accurately draw every important detail in the construction drawing.

3.4. Requiring the Ability in 1+X Combining Tests

In January 2020, the Ministry of Education announced the third batch of "1+X" vocational skill level certificates, including the construction engineering drawing vocational skill level certificates. In March 2020, the "Construction Engineering Drawing Recognition Skills Level Standard" was issued , Combined with 1+X verification requirements, the curriculum integrates the requirements of the verification drawing and AutoCAD drawing part into the curriculum assessment, organizes classroom teaching through task setting, reflects the teaching mode of "teaching, learning, and doing", allowing students to practice while learning The practice of middle school fully reflects the student's dominant position and the teacher's leading role, reflects the consistency of the learning process and the cognitive process, stimulates students' interest in learning, enables students to master relevant knowledge and skills in skill training activities, and enhances Students' practical ability and job adaptability.

4. Reform of the Teaching Mode

4.1. Online and Offline Blended Teaching Mode

Regarding blended learning, the simplest understanding of foreign research is: "blended learning refers to the mixing of traditional classroom learning and online learning."[4] Russell T. Osguthorpe, Charles. R. Graham (2003) pointed out, "For blended learning, it is to use the advantages of face-to-face learning and online learning to create a more ideal learning atmosphere and environment. At this stage, for blended learning, it's the mixed method includes the mixing of various learning activities, online learning and face-to-face learning, etc."[5]

4.2. Using New Types of Teaching Materials

It is convenient for students to learn more systematically anytime and anywhere. The courses are equipped with new-type teaching materials. You can view relevant knowledge explanations in the book, and you can also use mobile devices to scan codes to review related operations.

4.3. Strengthen the Examinations

After the application of blended teaching, the evaluation method needs to be reformed accordingly. During the evaluation period, it is necessary to highlight the double evaluation of the results of online learning and offline learning in an all-round way.

5. The Process of Teaching Implementation

The weekly learning tasks of the course are arranged as shown in Table 1, from diving to deep, integrating knowledge and skill learning into project teaching.

Table 1. The schedule of tasks in the course

Entry	Classes (hours)	Projects	Tasks
1	8	Project 1: AutoCAD basis	Task 1: Basic knowledge of AutoCAD Task 2: Orthographic projection of the three-sides Task 3: Drawing of the standard frame Task 4: Drawing of the five-star red flag
2	8	Project 2: Simple Architecture Construction floor plane	Task 1: Reading the floor plane Task 2: AutoCAD drawing of the floor plane
3	4	Project 3: Simple Architecture Construction elevational view	Task 1: Reading the elevational view Task 2: AutoCAD drawing of elevational view
4	4	Project 4: Simple Architecture Construction sectional view	Task 1: Reading the sectional view Task 2: AutoCAD drawing of sectional view
5	4	Assessment 1: Reading and drawing of architectural plane	
6	4	Project 5: Master Plane	Task 1: Reading the master plane
7	8	Project 6: Architecture Construction Drawing-Floor Plane	Task 1: Reading the floor plane Task 2: AutoCAD drawing of the floor plane
8	4	Project 7: Architecture Construction Drawing-elevational view	Task 1: Reading the elevational view Task 2: AutoCAD drawing of the elevational view
9	4	Project 8: Architecture Construction Drawing-sectional view	Task 1: Reading the sectional view Task 2: AutoCAD drawing of sectional view
10	4	Project 9: Architecture Construction Drawing-node details	Task 1: Reading the node details image Task 2: Printout
11	4	Assessment 2: Reading and drawing of building facade	
12	8	Project 10: Tagent Architectural Drawing	Task 1: Standard floor plane Task 2: Ground floor plane Task 3: Roof plane
13	4	Assessment 3: Reading and drawing of the architectural plane	

5.1. Before Class Work

To ensure the effective learning effect during class, adequate pre-class preparation is the key. Usually, students use books to preview, which cannot achieve the purpose of effective preview. Through the MOOC platform resource learning made by our teachers, the knowledge and skills are fragmented according to the project, which is convenient for students to study and review in a targeted manner. Students can use mobile devices to conduct pre-class preview anytime and anywhere, learn basic knowledge, practice basic command operations, complete tests, and record what they don't understand and operations they don't know.

5.2. In Class Work

The teacher summarizes and analyzes the students' academic conditions before class, retains or adjusts the preset important and difficult points, and re-analyzes and explains the key points of knowledge, repeats the test, and helps students to consolidate and digest the key content through the knowledge points, breaks through the difficulties with the help of information technology, and assists the students to fully grasp all the knowledge of the course And skills. Combining online course tests and random questions in class, it helps students consolidate their learning and lay a solid foundation from a full range of perspectives.

5.3. After Class Work

Exercises are reserved in class, and the review will be consolidated in time after class. The learning objectives of each course are clear and the difficulty is not great, so that students can make full use of the time after class.

5.4. Examinations

Curriculum assessment after the reform consists of two types of quizzes and stage assessments. The in-class quiz breaks down the big goal into several small goals and gradually realizes them; the stage test is arranged after the project learning is completed, and the comprehensive application test of knowledge and skills is carried out.

6. Conclusion

According to the characteristics of higher vocational students and the characteristics of civil engineering industry, architectural engineering drawing and CAD courses, teachers should compare the various modes of the course network teaching process, so that students can learn by themselves through the national resource bank and MOOC platform before class. The resource bank and MOOC platform self-study, after class, review and summarize through new-type textbooks, and use the national resource bank and MOOC platform to conduct homework evaluation teaching mode to improve the cultivation of students' comprehensive ability. According to the reality of insufficient self-discipline ability and independent learning ability of higher vocational students, in order to avoid students holding mobile phones and lack of concentration during class, in the teaching process, teachers should pay attention to not telling for a long time, but should increase some Attractive teaching links, such as homework display, exchange learning, practical teaching, etc. In addition, after the course is over, in order to urge students to consolidate the knowledge they have learned, teachers also need to design some practical exercises, homework, quizzes, etc., to consolidate their foundation. in addition, after the course is over, in order to urge students to consolidate the knowledge they have learned, teachers also need to design some practical exercises, homework, quizzes, etc., to consolidate their foundation. This combination of online and offline teaching mode not only cultivates students' sense of autonomous learning, but also improves students' ability to analyze and solve problems independently, providing them with a practical way to better adapt to social development in the future. method.

Acknowledgments

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