

Research on the Teaching Reform of Engineering Drawing for Electrical Majors

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Abstract: In order to adapt to the training objective of applied talents in higher vocational colleges, this paper embodies the law of knowledge and helps students to build the knowledge structure of engineering drawing courses. This paper discusses a teaching model of engineering drawing course suitable for online and offline blended teaching, which is constantly applied and explored in teaching practice, perfected teaching model and deepened course network resources, so that blended teaching model is constantly improved and promoted in practice, and provides a new idea for teaching reform in colleges and universities.

Keywords: Engineering drawing, Teaching reform, Blended teaching.

1. Introduction

Engineering Drawing is a compulsory basic course for engineering students, which plays an important role in curriculum planning. This course mainly enables students to study the principles and methods of drawing and reading engineering drawings. Combining theory with practice, this course lays a necessary preliminary foundation for cultivating students' drawing ability and spatial thinking ability, and plays a very important role in cultivating students' divergent thinking and innovation ability.

At present, with the rapid development of network technology, the penetration rate of Internet applications has been greatly increased, and the students use the network to carry out learning and communication has been a normal development trend, which has brought impact to the traditional teaching model. Blended teaching method introducing blended teaching method into the teaching of engineering drawing course and making full use of network learning resources and platforms has positive practical significance for the current teaching reform of engineering drawing course.

2. Analysis of Current Situation of Engineering Drawing Course

At present, higher vocational colleges have carried out engineering system courses for many years, but there are some problems more or less, which can be summarized as follows.

① Most students' learning of "engineering drawing" course stays at the level of "examination + credit", students lack of interest in learning, and lack of subjective learning consciousness;

② The teaching mode is single and the interaction is not strong. "Engineering drawing" course hours less, electronic information engineering major of Wenzhou vocational & technical college engineering drawing course is only 45 hours, teaching task pressure is large, the phenomenon of the traditional teaching often catch up, less link of classroom interaction, teachers do not understand the extent of the students to master knowledge and skills, which leads to the teaching effect is not ideal.

③ Students' learning initiative is not good, exploratory not strong. Due to the large amount of course knowledge, students cannot master knowledge in limited classes, and most of them cannot adjust their learning status in time. They are resistant to the "full house" teaching mode, and are passive in learning with low interest.

④ The number of students to re-take each year is also more, the second year of students to re-take often conflict in class, some students even re-take many times and can not pass, waste of teaching resources.

⑤ The evaluation method is outdated and not strong directivity. Traditional assessment methods can not reflect the real learning situation of students. Written examination is easy to cause students to surprise and cope with the examination, and can not assess students' practice and innovation ability, the examination is lack of directivity.

⑥ Due to the epidemic, many students because of the local policy and can not timely return to school to participate in the unified classroom training, resulting in and other students' learning progress has derailed, the difference is larger.

Therefore, it is necessary to change the current situation in terms of teaching methods and assessment measures, introduce online and offline hybrid teaching into the teaching of "engineering drawing" course, make full use of network learning resources and platforms, benefit teachers and students, optimize teaching work, and improve teaching effect and quality.

3. Reform Measures

The use of a variety of teaching models: offline classroom teaching, online video self-study + online centralized guidance and answer, offline or online re-study + offline centralized guidance and answer (re-study in independent classes) can effectively mobilize the enthusiasm of students, improve their learning initiative, and stimulate their potential. Strengthen the supervision and management of students' self-study, teachers make teaching plans according to the needs of teaching, and actively organize counseling for students, arrange regular centralized counseling and exercise classes, consolidate knowledge, and timely answer students' problems in learning.

① Watch the video preview before class

Students are encouraged to search for learning resources by themselves, and to put forward questions, opinions and suggestions for learning effects, and to communicate with teachers and students.

② Discuss research in class

In class, students are divided into groups of 5. Teachers organize students to discuss knowledge points, organize centralized training of corresponding skill points, display the graphics drawn by each group, and teachers and students comment on the problems in the graphics together, so that students can understand the knowledge in the process of positive thinking. After the discussion, one student from each group will be selected for a summary, and the teacher will make comments to comprehensively evaluate the task completion of the student group, and timely raise new questions to guide the students to further study.

③ Consolidate knowledge after class

After class tasks are assigned according to the teaching tasks. Students are required to complete the tasks with CAD software and submit the completion of the tasks online.

④ Evaluation of teaching effect

To establish a diversified process evaluation system, including teaching evaluation, process management and effect evaluation, feedback and improvement of teaching design, assessment and evaluation system, which can fully reflect the learning effect of students. Through the improvement of the examination method, comprehensive and full evaluation of students can form a closed loop of the whole teaching process. The course assessment includes objective questions (online) for basic knowledge points, subjective homework offline, deepening of basic knowledge points, and improvement of project-based drawing skills. In the course assessment, we pay attention to the process assessment, pay attention to the students' knowledge mastery and practical ability, pay attention to the training of students' language expression, summarization ability, and promote the diversified development of students.

The whole teaching design reflects the student-oriented teaching mode, aims to encourage students to explore new knowledge, cultivate students' teamwork ability, solves the problems in the traditional teaching of "engineering drawing", and obtains a better teaching effect.

4. Reform Teaching Effect

Based on the feedback of teaching practice, the author introduced flipped classroom into the teaching of "engineering drawing" course and obtained the following effects.

① This model stimulates students' interest in learning. Engineering drawing requires students to have high spatial imagination, strong practicality, and is very difficult to learn. Through flipped classroom, the text in the teacher's courseware can be transformed into animation, which makes students feel fresh, reduces the difficulty of learning, and stimulates students' enthusiasm and interest in learning.

② This teaching reform has trained students' practical ability. Through collecting materials, drawing engineering drawings, group discussion and expanding knowledge learning, the students learned to propose problems, design solutions and solve problems through teamwork, which greatly improved their practical ability and practical ability.

③ Blended teaching method truly reflects the learning effect of students.

Under the flipped classroom teaching mode, the discussion between teachers and students and students is sufficient, and students can master the key and difficult points well. At the same time, the assessment is more comprehensive, more directionality, can objectively reflect the learning effect of students.

④ The blended teaching mode makes the teaching task complete. In blended teaching mode, although the course hours are reduced, the students' learning time is not reduced. The online-offline blended teaching method lays more emphasis on students' self-consciousness. Teachers focus on key points and difficult points in teaching, guide students to explore actively, and promote students to learn actively, with a high degree of completion of teaching tasks.

5. Conclusion

Engineering drawing is a very rigorous discipline, in the practical application can be said that a miss is a thousand miles. With the ever-changing knowledge in the "Internet +" era, the course reform of engineering drawing should not only combine the current situation of economic development, but also pay attention to the development of the industry. We should take students as the center, give full play to the subjective initiative of teachers and students, make full use of multimedia, artificial intelligence, big data and other resources, realize online and offline interactive teaching, constantly extend the breadth of classroom teaching, expand the depth of teaching, and achieve the teaching objectives of engineering drawing course.

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References

- [1] Yang Zhenli. Based on the Internet plus "digital electronic technology" course on the construction of smart classroom[J]. Distance education magazine.2020(23):245-249.
- [2] ZHANG Yan,SUN XiLing.Teaching Reform and Application of Circuit Basic Experiments[A]. Proceedings of 2019 International Conference on General Education and Contemporary Development[C]. 2019.
- [3] JIANG Y Z, LIU F Y, WU Q, et al.A method for geometric tolerance annotation and position adjustment of engineering graphics [J] .Journal of physics:conference series, 2021, 1820: 012149.
- [4] Guifang Chang,He Zhu,Yingying Tian,Xiaojun Chi,Yan Yan,Yanxia Xing. Application of Flipped Classroom in New Technology of Modern Animal and Aquatic Products Processing Experimental Teaching[A]. Proceedings of 2019 International Sports Science and Education Technology Conference(ISSSETC 2019)[C]. 2019.
- [5] Yunqiu Jiao, Xiaojie Li, Yazhou Li, Research on Cross-border E-commerce Practice Teaching Reform Based on Collaborative Education Perspective, 2nd Asia-Pacific Social Science and Modern Education Conference (SSME) [C].2019.
- [6] Sisi Wang,Lijun Wang. Reform Scheme of Marine Electrical and Electronic Courses based on Improved Blended Teaching Method[A]. Proceedings of 2019 9th International Conference on Social Science and Education Research(SSER 2019)[C]. 2019.

[7] Zhang Hanbin. Blended Teaching Mode Based on Rain Classroom in College English[A]. Proceedings of 2019 5th

International Conference on Applied Materials and Manufacturing Technology(ICAMMT 2019)[C]. 2019.