

Exploration on the reform path of blended practical teaching of engineering majors based on constructivism

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Abstract: This paper mainly discusses the importance of practice teaching in engineering majors, analyzes the problems existing in the current mixed practical teaching mode of engineering majors, including the imperfect content of practice teaching, the imperfect platform of practice teaching, the inappropriate method of practice teaching, the inappropriate evaluation of practice teaching, and analyzes the feasibility of developing mixed practical teaching based on constructivism theory. Four reform paths of customized and matched practical teaching resources, construction and sharing of practical teaching platform, exploration of cooperative learning practice teaching method, and whole-process multiple practical teaching evaluation are proposed to help improve students' learning interest and thirst for knowledge, cultivate students' independent learning ability, and improve students' practical ability, so as to achieve high-quality mixed practical teaching. To help cultivate application-oriented engineering and technical talents needed by The Times.

Key words: Constructivism; Mixed; Practical teaching; Engineering

1. Introduction

With the continuous development of science and technology, engineering major plays an increasingly important role in higher education. Since February 2017, the Ministry of Education has been actively promoting the construction of new engineering majors, among which emphasis has been placed on cultivating high-quality composite new engineering talents with strong practical ability, strong innovation ability and international competitiveness. Practical teaching in engineering majors is an effective way to consolidate theoretical knowledge and deepen theoretical understanding, an important link to train high-quality engineering and technical personnel with innovative consciousness, and an important platform to combine theory with practice, train students to master scientific methods and improve practical ability. Therefore, practical teaching plays a vital role in the training of engineering talents. With the advent of information and digital age, the traditional teaching mode of engineering is under the impact of information technology, and it is imperative to transform and develop, among which blended teaching is the full application of information technology in teaching. However, this teaching mode also has many shortcomings, and it is necessary to improve the problems existing in the blended practical teaching mode, so as to train application-oriented engineering and technical talents to meet the needs of The Times with higher quality.

2. The main problems of blended practical teaching

2.1 The content of practice teaching is not perfect

Blended practical teaching in colleges and universities is carried out according to the traditional fixed mode, with unified teaching and relatively fixed content. It fails to design teaching content according to students' needs, ignores the differences among different students, fails to meet the needs of different types of students, reduces students' learning initiative, and fails to build a good learning atmosphere. Blended practical teaching also integrates a lot of knowledge and skills into online resources to facilitate students' learning, but neglects resource updating. At present, the industry is undergoing rapid transformation and upgrading, but there is a serious lag in the allocation of online practical teaching resources, which contradicts students' existing knowledge and experience, and is not conducive to students' independent construction of knowledge.

2.2 The practical teaching platform is not perfect

At present, blended practical teaching relies on different online platforms, including MOOCs, Super Star, Rain Classroom, "Classroom style", mobile wechat and simulation experiment platform, etc. Most platforms are not fully developed and their functions cannot meet the teaching requirements. At the same time, some platforms still have unstable operation, resulting in the lack of emotional communication among students or communication barriers. The offline platform of blended practical teaching mainly relies on the school-enterprise cooperation training base. Not only the number of school-enterprise cooperation is limited, but also the acceptance capacity of enterprises is limited. The frequent change of on-site instructors is not conducive to the continuous improvement and development of teaching.

2.3 The practice teaching method is not adaptable

The development of blended teaching mode requires teachers and students to adapt to the transformation of this mode. At present, most face-to-face classes of blended teaching are sometimes no different from traditional classes, only the main knowledge points are taught again in a more concise way, and there is no enough time for collaboration and communication. The same problem also exists in blended practical teaching. Teachers are still used to the imitative practice teaching method, and then explain the technical theory and operation process again, even if the teacher adopts the student-oriented inquiry and heuristic teaching, it may be forced to change back to the traditional classroom because the students do not cooperate. Growing up in the background of exam-oriented education, students are accustomed to the learning mode of teachers instilling knowledge, and they do not have or are unwilling to do practical work. Moreover, the effect of online communication and discussion is not good, and their subjective initiative cannot be played.

2.4 The evaluation of practical teaching is not suitable

Teaching evaluation includes process evaluation and summative evaluation. Blended practice includes two links: online and offline. As for offline practice, paper work is still the main form, and it is difficult to quantify students' participation and learning autonomy. As for the lack of effective supervision in online teaching, it is difficult for teachers to accurately evaluate the effect of students' autonomous learning. At the same time, the evaluation subject is mainly the teacher, there is a single, can not really objectively evaluate and distinguish the degree of students' independent construction of knowledge.

3. Feasibility of blended practical teaching based on constructivism

The earliest proposer of constructivism can be traced back to J.Piaget in Switzerland. Constructivism has absorbed the essence of discovery learning theory, meaning learning theory and historical and cultural psychology theory. Since the 1980s, the theory of constructivism has been introduced into China, because it reveals new teaching knowledge laws, has made great breakthroughs in education science, and has gradually become popular in the field of teaching, and has become an important theoretical basis for curriculum reform in China. According to the constructivism learning theory, in the whole learning process, in order to give full play to the subjective initiative of learners, teachers should create appropriate environment and conditions to guide learners to actively construct knowledge in their minds based on their existing experience through discussion, writing, thinking and other active inquiry processes. The subjective initiative emphasized by the constructivism learning theory is very suitable for application in engineering practice teaching with strong experience, and the theory fits perfectly with online teaching, in which the situation, collaboration, communication and active construction emphasized can be realized through online teaching. However, pure online teaching has some problems such as lack of learning atmosphere, low learning enthusiasm, lack of emotional communication and lack of supervision environment, which leads to poor learning results. Although the traditional input mode of online teaching can help students remember what they have learned, it can't help them apply what they have learned to practice, especially in the highly practical majors such as engineering.

Blended teaching is a kind of teaching that combines the advantages of online teaching and traditional teaching. The blended teaching mode includes practice-oriented blended teaching mode and blended teaching mode for engineering theory courses. The practice-oriented blended teaching mode covers multiple teaching links such as online learning, learning on the job, face-to-face teaching, after-class lectures, etc. The research shows that blended teaching has a moderate effect on promoting practical skills. Feng Xiaoying pointed out that the concept of mixed teaching in the "Internet +" stage emphasizes "student-centered", which coincides with the concept of constructivism. At present, in the era of information technology and digitalization, the concept of "meta-universe" rises, which provides more possibilities for the creation of blended teaching environment, and is more conducive to students' independent construction of knowledge system. Therefore, it is feasible to carry out blended practical teaching based on constructivism theory. At the same time, under the guidance of constructivism theory, the problems existing in blended practical teaching can be solved more effectively.

4. The reform path of blended practical teaching based on constructivism

4.1 Customize and match practical teaching resources

Abundant practical resources are the basis of self-construction. Practical teaching resources for engineering majors involve a wide range. By setting up a practice resource sharing platform, we can build and share practice resources with other universities and enterprises, so as to ensure the richness of online practice resources and ensure that resources can be updated regularly. On this basis, relying on the blended practical teaching platform, on the premise of meeting the basic teaching requirements, the pre-test of practice teaching is carried out, respecting the richness and diversity of students' experience world, mastering students' needs, classifying students, and compiling corresponding practice teaching plans according to the classification of students. Through big data analysis and artificial intelligence technology, each student is provided with customized learning resources and paths to help them master knowledge and skills more effectively, and promote students' active construction.

4.2 Build and share practical teaching platforms

Creating suitable environment and conditions for students is the premise of knowledge construction. Online, teachers should assess students based on the platform, and students should discuss, write, think and other active exploration based on the platform, which requires the construction of a hybrid online practice teaching platform to meet the teaching needs. Colleges and universities can select platforms suitable for online practical teaching through market research, so as to build online practical learning platforms and virtual reality classes, etc., or universities can jointly develop exclusive practical teaching sharing platforms and set relevant teaching functions according to needs. Offline, colleges and universities should actively cooperate with industries, enterprises and societies to establish offline practical teaching resource base and teacher base, establish long-term cooperative tutorial system, ensure the stability of the platform, so as to continuously improve offline teaching links and conditions.

4.3 Explore the practical teaching method of cooperative learning

Student-centered instruction is key to knowledge construction. The role of teachers changes from the authority of transferring knowledge to the instructor of students' learning, becoming the senior partner or collaborator of students' learning, actively helping and guiding students to build knowledge, stimulating students' learning interest, triggering and maintaining students' learning motivation. First of all, it is necessary to change the concept of teachers through training, teaching and research, enhance the ability of teachers' blended teaching, and establish the main position of students in blended practical teaching. Secondly, in the process of blended practical teaching,

students should play the role of teachers. Hot topics in the industry, engineering cases and other content that students are interested in can be published through online forums to promote students to discuss and exchange with each other. Teachers can give positive feedback, which can effectively maintain students' interest in learning. Offline, we can publish recording practical operation skills tasks and group cooperation tasks for encourage students to internalize knowledge through hands-on practice, and convert internalized knowledge into visual practical results to stimulate students' subjective initiative.

4.4 Evaluation of multi-practice teaching throughout the whole process

The whole process of diversified teaching evaluation is the guarantee of knowledge construction. The purpose of practical teaching evaluation is to reflect the results of students' practice, through which students' practical ability can be judged. Therefore, teachers should establish the corresponding teaching evaluation index and set up the assessment scale according to the practical teaching objectives. With the help of advanced teaching platform, control the learning quality of practice process, incorporate students' active learning degree and contribution degree in group cooperation into the scope of teaching evaluation, and examine the learning effect of students' mixed practice through teacher-student-enterprise evaluation, competition, test, group task, etc., so as to form a "whole process and diversified" teaching evaluation to help students understand themselves correctly and build a better knowledge system.

5. Conclusion

The blended practical teaching of engineering majors based on constructivism combines the advantages of online and offline teaching. Under the guidance of the constructivism learning theory, through the customization and matching of practice teaching resources, the construction and sharing of practice teaching platforms, the exploration of cooperative learning practice teaching methods, the evaluation of multi-process practice teaching to improve students' learning interest and thirst for knowledge, cultivate students' independent learning ability, improve students' practical ability, improve the quality of blended practical teaching qualitatively, and help cultivate application-oriented engineering and technical talents needed in The Times.

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Supported by: Research Achievements of the 2022 Annual Research Project of Modern Distance Education Society of Zhejiang Province (Project No. DES-22Z07); General research results of Ningbo Lifelong Education Research Base in 2023 (Project number: ZS6-202301)