Research on the Teaching Mode and Strategy in the Construction of the First-Class Major of Mining Engineering

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Abstract. In order to implement the new educational concepts and teaching methods into the development of mining engineering, promote the construction of first-class majors, and cultivate outstanding undergraduate graduates with the ability to solve practical problems in complex engineering, the work combines teaching theory with teaching practice, analyzes the integration of information technology and higher education and the construction of first-class professional courses with mass online open courses as the core, the diversified development of flipped classroom and other teaching modes. It affirms the important role of blended teaching in the process of improving the quality of higher education, the blended teaching mode and strategy of mining engineering specialty are put forward, and it is expected to provide suggestions for the development of mining engineering.

1. Introduction

With the in-depth integration of information technology and higher education, the construction of first-class professional courses with open online courses as the core has become the focus of undergraduate education reform. Massive open online course, flipped classroom and other teaching modes have diversified development, and blended teaching has gradually become the focus of current educators.[1,2] How can we implement the new education concept and teaching method to the construction of mining engineering specialty, cultivate the excellent graduates who have the ability to solve the practical problems of complex engineering, and then promote the development and construction of first-class specialty? This is a problem that is being considered in the development of mining engineering. How to effectively carry out blended teaching, the majority of front-line teachers are still struggling to explore. The curriculum is the concretization, operation and target of the basic standard of talent cultivation of "moral education and human achievement". It is also the short board, bottleneck and key point of current Chinese universities. To improve the quality of talent cultivation and promote the development of disciplines, it is necessary to do a good job in curriculum construction and promote the development of blended teaching. The main problem is how to stimulate the enthusiasm of college students for online learning and at the same time give full play to the advantages of teachers, such as the role of guidance, to achieve personality influence, learning and research method oriented.

2. The Development of Higher Education Teaching Theory

With the further application of educational theoretical results, higher education teaching places higher demands on teachers.[3]In the new-type teaching reform, the reconstruction of the teaching environment, teaching content and teaching participants is required. Teaching concepts such as teacher-student role change, data-driven teaching feedback, grasping student attention, and developing students' multiple abilities are deeply affecting university education in China.

Blended teaching theory fully embodies the gradual transformation from behaviorism to

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cognitivism to constructivism, which is generally recognized as the best cognitive learning theory. Behaviorism emphasizes objective experimental methods. Cognitivism emphasizes the subject value of human beings in learning activities and fully affirms the learners' conscious initiative. While constructivism emphasizes the multifaceted nature of knowledge, self-construction, construction process and results in a specific environment. The trend of the integration of these ideas has guided Chinese higher education from advocating online open courses to developing flipped classroom, and then paying attention to blended teaching, which is in line with the objective cognitive law.

3. Development of Teaching Theory of Mining Engineering

The teaching mode of transmission and acceptance, which was introduced into China by Kairov of the former Soviet Union, is based on behaviorism psychology and originated from Herbart's four-stage teaching method. This kind of receptive "injection" education form overemphasizes the one-way knowledge transfer, focuses on fully mining the role of human memory, understanding and indirect experience in mastering knowledge, and emphasizes the control of learners' behavior to achieve the predetermined goal. Mining engineering belongs to the practical subject, which makes it difficult for learners to really understand the received information. Students' direct access to book knowledge, made whom lack of cognitive experience, limited potential development, which is not conducive to the development of analytical, exploratory and innovative learning. It is not conducive to the cultivation of students' innovative thinking and the ability to solve practical problems.

The long-term education practice of the mining engineering specialty has proved that the amount of information on mining engineering expertise is huge, and the realization of most educational capabilities depends on classroom functions. They are scattered in each lesson, including the cultivation and improvement of learning ability, expression ability, communication ability and so on. Only when teachers insist on practical and guided teaching along the way can students not only gain professional knowledge, but also receive the essence of subject education.

4. Blended Teaching Mode and Strategy of Mining Engineering

To carry out the concept of "students oriented" in teaching, adopt project oriented and problem oriented teaching, and stimulate students' enthusiasm for learning, it is necessary to implement the new educational concept and teaching methods to the professional construction, and urge students to apply their learning, which has always been the focus of mining engineering undergraduate teaching.

4.1. The reflection of mining engineering teaching

The importance of Chinese higher education to the future of the country and its citizens is self-evident. [4] In Chinese universities, how to link knowledge to teaching quality, what students learn and how much students learn, these issues often go unnoticed. Under the current situation of shortage of education resources to solve the problem of education quality is an urgent problem in the construction of mining engineering specialty.

It is equally important to focus on the quality of education and the future of higher education, ensuring the affordability of university costs and improving the chances of students completing their education programs successfully.[5,6] In terms of "quality", our goal is the quality of the university experience: how the university classroom and the macro-teaching environment cultivate and shape students' knowledge systems, behavioral capabilities, values, and methods of realizing life value, rather than domestic reputation for university and resource rankings.

In the teaching process of mining engineering, students are often limited to the accumulation of professional knowledge, limited by educational resources and lack of sufficient engineering training. In other majors, such as aviation or surgery, the teaching mode of emphasizing theory rather than practice leads to the lack of practical ability and practical experience of undergraduate students. When they encounter complex engineering problems, they are helpless and perform poorly.

The lack of attention to the quality of mining engineering education is consistent with how to

train mining teachers to have corresponding teaching literacy. The preparation of teachers does not coordinate with what they really do, and this inconsistency is that the difficulty of becoming an excellent teacher lies in that on the one hand, they should be familiar with mining discipline, and the rest can learn "at work". A large amount of evidence shows that high-quality preparation is essential for primary and secondary school teachers, as is the case for teachers in undergraduate colleges.

What can Mining engineering do to educate undergraduates and to what extent can these jobs be done? For these problems, the existing university rankings and the discussion on the advantages and disadvantages of the higher education system have not been explained. What kind of knowledge and skills do students gain? As a member of society and major, how do students grow up? How can teachers prepare and get feedback to improve their teaching quality? How can students integrate into the broader teaching environment to meet their own needs? Although the results of these problems are difficult to quantify and rank, in the field of mining engineering education, there have been leading researchers and practitioners who pay high attention to these problems.[7]

The "quality" of similar mining colleges and universities, as well as schools capable of providing micro classrooms and modern teaching equipment, has a certain relationship with students' studies and growing up to be pillars. However, high-quality teaching experience and deep learning can be realized in various teaching places, especially in today's high-speed development of technology, through the development of virtual simulation teaching platform and the sharing of MOOC resources. The best learning environment depends on the characteristics and conditions of students. How to grasp the characteristics of students in classroom teaching? This requires the deepening design and organization of the mining engineering teaching process.

4.2. The common problems in mining engineering teaching

4.2.1 Poor teaching methods

At present, the teaching of mining engineering courses is mostly a single multimedia method. Students only watch the courseware passively in class, which cannot stimulate students' enthusiasm for learning and even achieve the teaching purpose for some students.

4.2.2 Stereotype teaching content

At present, a large number of knowledge used in teaching materials are old and do not involve design principles and design ideas. The application of knowledge is even blank. Students do not get effective ability training, and their awareness of innovation and competition is weak.

4.2.3 Rigid classroom atmosphere

The knowledge taught by teachers is out of touch with practical application, students' learning objectives are confused, and classroom teaching is unattractive. The students' learning motivation is insufficient, and the classroom atmosphere is rigid.

4.2.4 Formal innovation education

At present, in the teaching process of mining engineering major, one does not reflect the cultivation of students' quality and ability, and the other does not pay attention to the assessment of students' practical ability, which leads to the lack of enthusiasm, weak competitiveness of students, and the innovation of teaching is a mere formality.

4.3. The proposal of blended teaching strategy

To achieve the goal of first-class professional curriculum construction, it is necessary to solve the specific problems existing in the current classroom.

4.3.1 Exchange of teacher-student relationship

Under the premise of ensuring teaching quality, new teaching contents are adopted to realize the exchange of teacher-student relationships. It is necessary to improve students' understanding of learning the purpose and cultivate students' awareness of active learning in teaching. Take students as the main body, let students have their own opinions, let students' reading ability, thinking ability and logic ability get effective exercise.

4.3.2 Diversified teaching methods

At present, access to information is convenient. Virtual technology and 3D technology have a good effect on knowledge demonstration and explanation. In order to make students more interested

in more efficient learning, teachers urgently need diversified education and teaching methods.

Blended teaching just provides a professional platform to promote teaching reform. Blended teaching needs the support of the environment and specific teaching strategies.

4.4. The environmental support for blended teaching

In the learning environment of mining engineering, advanced and complex knowledge content is presented in the form of problems in specific scenarios, and there are relevant cases. Students need to use relevant information and cases to acquire knowledge and the ability in solving situational problems. In order to achieve this goal, we cannot do without the support of the following teaching environment.

4.4.1 Information resources

Learning contents and related auxiliary learning materials, including textbooks, pictures, videos, teaching software, related papers, etc.

4.4.2 Learning tools and platforms

New teaching tools and platforms are important equipment to support and guide students to carry out innovative learning.

4.4.3 Autonomous learning strategy

In order to achieve the goal of learning, students should actively explore and discover in the learning environment, that is to say, they must study independently.

4.4.4 Organization and guidance

In the learning environment, learners are the main body of learning, but they do not ignore the guiding role of teachers. In any learning environment, teachers should shoulder the responsibility of the organization, management, help and guidance.

4.5. Blended teaching mode of mining engineering

4.5.1 To strengthen the course assessment

The purpose is to test the learning effect of students and provide feedback to teachers, so as to promote the teaching quality, improve teaching methods and improve teaching skills. Technological progress makes it easier to observe classroom practice and evaluate students' performance (including but not limited to examination results) and saves a lot of costs.[8,9]

Course assessment can avoid one-sided evaluation. The college examination is carried out at the end of professional courses. The assessment of engineering students is only to see the final test paper results, which cannot fully measure the real learning situation of students, and even reflect the real level of some students. In order to measure students' performance objectively, we should introduce the idea of multiple evaluation, establish a variety of evaluation systems, try to evaluate students from many aspects, and avoid the adverse consequences of a single evaluation.[10,11]

Curriculum assessment can avoid the stereotype of theoretical assessment. The efforts of the students are only used for one week before the examination. The main reason lies in the way of assessment. The assessment content is too boring, theoretical and bookish. The test questions copy the book content and draw the key points on the teaching materials, which results in students reciting the test content only before the test and turning the assessment into memory. Students' learning initiative is seriously bruised. In order not to attack the students' initiative of autonomous learning and avoid the surprise before the examination, we can start with the reform of the content and assessment methods of the test paper, add the subjective assessment method, pay more attention to the application of learning, strengthen the usual assessment, and reduce the proportion of theoretical and book based test paper.

4.5.2 Adopt project oriented and problem-oriented teaching

Nowadays, there are a large number of students pursuing higher education, and the demand is also becoming diversified. To achieve real success in education, we need to pay close attention to the education process and student experience. College education is more than just getting students a job. In the Internet age, even if they are looking for jobs, college students should learn to solve problems flexibly and deal with unconventional jobs to adapt to the rapid development of the economy. Earl Lewis's 2.0 agreement on moving to the humanities and Thomas Bailey and Clive Belfield's wrong dichotomy between academic learning and vocational skills solve the familiar but

wrong dichotomy between academic or humanities learning and vocational training. We can see clearly that narrowing the scope of education to specific vocational preparation will only backfire.

There are three conditions for the self-regulated learning strategies suitable for students' individual characteristics: first, to give full play to the initiative of students in the learning process, to reflect the initiative of students; second, to give students multiple opportunities to apply the knowledge they have learned in different situations (externalizing the knowledge); third, to let students form the objective things according to the feedback information of their own actions Know and solve practical problems (realize self-feedback).

Teachers determine learning tasks in the learning environment, organize learning activities, provide help and guidance, and guide students to use cognitive tools correctly. Teachers are organizers, directors, helpers and promoters of the teaching process. The students are divided into groups according to the conditions. After class, they can learn independently, consult materials, discuss plans, report in class, comment and guide by teachers, mobilize students' subjective initiative, and promote students' mastery, understanding and application of professional knowledge. Project oriented teaching advocates’ students to find and solve problems by themselves. It aims to train students to think independently and takes teaching materials and projects designed by teachers as content, so that students can learn through rediscovery steps. It puts forward relevant questions to students, guides them to study and collect relevant materials, and through active thinking, realizes the formation steps of the concept and principle of "discovery".

Project oriented learning has four advantages: first, it is conducive to mastering the knowledge system and learning methods; second, it is conducive to inspiring students' learning motivation and enhancing their self-confidence; third, it is conducive to cultivating students' thinking pattern of finding and creating attitude exploration; fourth, it is conducive to the consolidation and transfer of knowledge and skills.

4.5.3 The development and application of the virtual simulation teaching experiment platform of mine production can improve the teaching of engineering practice courses

The impact of classroom and campus environment on students' development is beyond the scope of specific academic disciplines. In the virtual simulation teaching of mining engineering state perception, with the help of an advanced virtual simulation platform, the virtual mineral mining and beneficiation process is constructed with realistic physical modeling. Through the monitoring of parameters setting and output data in the simulation software, the students can understand and grasp the theoretical knowledge related to the actual mineral mining and beneficiation process in their own environment and realize the opposite mineral mining and beneficiation Perception and control of process state and characteristics. On this basis, through the actual control and feedback of ore key parameters in the mining and beneficiation process, the process and principle of mining and mineral separation are deeply understood. Finally, the whole simulation process is completed through the operation of simulation experiment.[12,13]

Through the statistics and arrangement of the experimental data, the complicated mineral mining and beneficiation process is visualized to help students understand and master the theoretical knowledge and engineering practice more thoroughly. The simulation experiment on the virtual simulation platform can also solve the problem that students are unable to carry out real experiments due to the limitations of conditions, reduce the constraints of multiple important factors such as experimental equipment, experimental site, experimental conditions, etc., and the experimental process is more secure, so the control power of the guidance teachers for supervision and guidance is greatly improved. The experimental loss is low, which greatly improves the accumulation of students' actual operation simulation.[14,15]

In the process of virtual simulation experiment teaching of mining engineering, the teaching concept of student-centered is embodied. Each student completes his own virtual experiment process independently, with self-learning and experience as the main part, teacher guidance as to the auxiliary, and teachers and students jointly complete the comprehensive design experiment project, so as to achieve students' Acquisition and consolidation of basic knowledge and improve practical operation ability. Every link in the whole design process is guided by teachers and system,

and problems are found and corrected in time. As the focus of teaching activities is on the process and results of the experiment, it is beneficial for students to master the knowledge and apply the knowledge to solve complex engineering problems.

Students can enter the learning mode for free practice and enter the assessment mode for experimental operation and assessment after being proficient. The background of the platform will give practical results according to the correct operation and proficiency of students, that is, the time to complete the virtual simulation experiment.

After the students complete the practical operation, they answer the relevant questions online. After submitting, the teacher will review them online, give the answer results and submit them to the platform. From the experimental operation, experimental data, experimental reports and other dimensions, to investigate whether the students are proficient in the experiment, to achieve the requirements of the experiment, according to the specific assessment method table, to evaluate the students.

With the help of the instructor, students can have a clearer understanding of the virtual simulation experiment, and show a strong interest in the virtual simulation platform and software. Its convenience and accuracy are unanimously recognized. The operation of simulation software and platform is simple, the interface is simple and clear, and students can quickly master the use method. After many times of practical operation simulation, most students' scientific research problems are solved, and students' cognition and mastery of theoretical knowledge of beneficiation process are strengthened, showing the broad development and Application prospects of the simulation platform and software.[16,17]

5. Conclusion

This article considers the future of higher education in the current educational situation, proposes blended teaching models and strategies, and gives convincing cases in mining engineering teaching. Ensure that education resources are in short supply with practical solutions, deepen classroom teaching, and personally train undergraduates. Students today have achieved conflicting results, showing that higher education is not enough to complete existing learning. The construction of a first-class professional in mining engineering has a long way to go. We must study more deeply how students learn, how to develop and effectively support teaching at the professional level, and we should deeply study how to really educate students rather than just award them diplomas.

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