Application of PBL Teaching Method under the Excellent Plan in High Voltage Technology of Course

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Abstract

PBL teaching method in question as the main line, to the classroom problem of the form of abstract concept conversion, through put forward, analyzing and solving problems, guide students to active thinking, so that the students from passive to accept into autonomous learning, improve the enthusiasm of learning. In this paper, through the implementation of the PBL teaching method in classroom teaching of high voltage technology, cultivate the students' ability of problem solving, knowledge acquisition and the team cooperation, help to achieve the goal of training outstanding engineers.

Keywords

Excellent engineer; PBL teaching method; High voltage technology

1. Introduction

"The education and training program of the outstanding engineer" is aimed at the industry, the world and the future. Cultivate and create a large number of high quality engineering and technical person with high ability of innovative, meeting the needs to the economic and social development. It's laying a strong human resources superiority to build an innovation-oriented country, to realize modernization and industrialization, to enhance our core competence and Comprehensive National Power. In 2013, electrical engineering and automation Specialty in our college became one of the major projects of "excellence". The core of "excellence plan" is the innovation. With the development of "excellence plan" in the application oriented undergraduate colleges, the mode of the traditional teaching only emphasizes the knowledge but neglect the students' ability training of the malpractice is increasingly prominent, is not conducive to the implementation of the outstanding engineer training plan [Lin Jian, 2012].

PBL(problem based learning) teaching mode is "taking students as the main part, taking the problem as the center". Under the guidance of the teacher's overall grasp and the emphasis on the students' active participation, the essence of which is to play a guiding role in the learning process, mobilize the initiative and enthusiasm of students learning. PBL teaching mode is a kind of teaching method which is based on the combination of theory and practice in the development of the times and the trend of education reform. It can stimulate students autonomous learning, cultivate students with critical and creative thinking as well as the ability to solve practical problems through the development of PBL teaching mode, And make them to become new Cross-century outstanding engineers with innovation and application design ability [Zhang Bo, 2014].

2. The neccessity of pbl teaching in high voltage technology under the excellent plan

The traditional teaching method is not only easy to cause the fear and weariness of difficulties to students, more against the target of cultivating talents of outstanding engineers. With the development of high voltage technology changes with each passing day, other related equipment upgrades, an urgent need to take timely measures, updating the teaching contents, improving teaching methods, therefore, application of PBL teaching method in the high voltage technology course is necessary.

2.1 High Voltage Technology PBL Teaching Methods in Line with the Outsanding talent training goals of the plan

From the goal of "excellence" and the talents training target, we should pay more attention to the Specialized course education based on high voltage technology. In the course of using PBL teaching method can improve the students' thinking and innovation ability, every participant needs use their creativity and initiative ability actively, learning scientific knowledge behind the superficial problem, and acquiring the ability of autonomous learning. To cultivate one who has international competitive talent, to adapt to the needs of economic and social development, to realize the talents training goal of outstanding engineers.

2.2 High Voltage Technology PBL Teaching Methods Can Stimulate Students' Interest in Learning and Enhance Learning Motivation

PBL teaching method use the problem as the main line, combining the abstract concept of "high voltage technology"course with problem introduced, analyzed and solved, so that the students can learning autonomous but not from passive to accept[Xie Ying, 2014]. One hand, this accords with the students' cognitive structure, on the other hand also reflected that the student as the main part, teachers as the leading advanced education concept, can play an utmost role in mobilizing students' learning interest.

2.3 High Voltage Teaching Methods Mode Can Cultivate Students' Participate Spirit and Team Awareness

Under PBL teaching mode, students participate in class discussion, design and evaluation in the form of group, they have a clear understanding of the learning objectives, in the long term, the students will be able to improve the sense of participation and the sense of identity. Students are no longer fight a lone battle, then to cultivate their sense of teamwork, build up their confidence in the course of high voltage technology.

3. The implementation of pbl teaching method in high voltage technology

3.1 Set the Task before Class and Build Problems

The main characteristic of PBL teaching method is the problem as the core, in order to develop the teaching method around the problems. Therefore, in order to design the question carefully. The issues are designed should be multi-angle, multi-mode and multi-level. The high voltage technology curriculum group of teachers study the characteristics of each course, concise a series questions according to the foundation, widen a spiral upward trend with innovative learning rules, set learning goals, at the beginning of the new section, design universally problem, let the students understand the teaching content chapter from the question, then the designing problem must have a certain difficulty gradient, so that students can enjoy some fun from the process of solving the problems, so as to achieve the purpose of stimulating students learning enthusiasm. At the same time, the teacher will combine their own scientific research projects, new knowledge and new technology with the teaching case, in order to enrich the students' vision, to achieve the best learning effect.

3.2 Classroom Teaching implementation

In the first class, the whole student will be divided into 6 groups freely, 5 person in group, according to their interest and hobby. To require students to work as a team to complete the classroom problems and homework, encourage self inquiry, stimulate and support students' initiative thinking, enable students to discuss and exchange their thoughts in the process of exploration and research.

The question will be introduced by teachers first at the beginning of each class, then answered by each student in the group, at last the teacher will give a explanation in-depth, which beg the teaching key and difficult points of this lesson, so as to complete the teaching purpose of this class. During the class, teachers guide the students to think and explore, to find and master the relevant conclusions through the principle and the relevant examples. Taking the measurement method of insulation resistance as an example: firstly, the definition of insulation resistance is put forward? Let the students think about the answer, which leads to explain the principle of the measurement circuit; second, put forward how

to prevent the measurement error problem, the method of solving the problem by the students. Another example: in explaining restrictions of corona discharge, first proposed what is the corona? The phenomenon of corona discharge in 1000kV UHV transmission project is introduced by the picture (Figure 1).

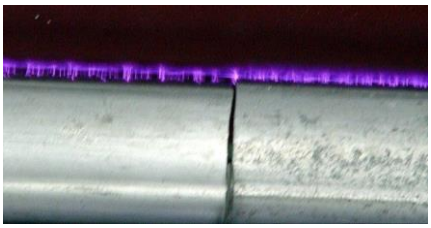

Figure 1. corona discharge in 1000kV UHV transmission project

Not only, in a semester of study, students can access through the network about the latest, domestic and international academic trends of this course, and carry out more than 3 lectures. Each lecture about 20 minutes, each student can deliver a speech, the student would be a teacher, the teacher as a student, each "student" can issue a question. After practice, students are very interested in the academic dynamics of teachers, and they are active to reading materials, to publish a speech without a push, subject to the unanimous praise of faculty leadership, changing the teaching state ,dull, medicore, of the past, received a good teaching results.

At the end of the course would arrange a outdoor visit practice of high-voltage test transformer substation, combined with the substation equipment, then to sort out and summarize the content of the course one by one , to show students a systematic and intuitive of understanding and awareness, from the produced of high voltage to the test equipment, from the insulated theory to the insulation testing technology, from the power system to voltage protection and so on, linking theory with reality let the students immersive, and open their eyes.

3.3 Independent Learing after School

Due to the less study hours and much content more difficult of "high voltage technology" course , the classroom teaching cannot feed an army. Therefore, we established the "high voltage technology" course teaching website, including the course syllabus, teaching PPT, homework review, experimental instruction, curriculum design guide, exchange of questions, discussion, online testing, questionnaire survey and other columns. Make full use of network teaching resources, online learning, transfer of reference materials, build a good communication platform, for teachers and students, students and students to interact, exchange their minds improving the teaching efficiency, and enhancing the teaching effect.

Teachers can also make full use of students interest such as QQ, WeChat, Fetion, blog and other network resources, communicating with student and stimulating the students' learning interest.

3.4 Final Assessment

In order to promote the PBL teaching mode, and to realize the target of cultivate excellent engineers we must reform the traditional examination method, carry out the homework, final examination, experiment ability, panel discussion, lecture, etc, system, and increase the proportion of the students' behaviour, like communication, team work spirit, etc., and range the degree from A to E， formate the teachers' assessment of students. For example: according to the student attitude of participating to teaching activities, " involved occasionally, performanced superficial, and the interest is limited" to fail; " contributed a little, had a good learning attitude and a bit interest" to qualified; "involved often, had a deep understanding of the topic and had a correct target of learning" to good; "actively and constructively participate in discussions and answer questions, had a deep understanding, very interested with high enthusiasm" to excellent[Zhang et al., 2013]. Therefore, if students want to get excellent in PBL teaching, they must actively and constructively participate in discussions and answer questions, very interested with high enthusiasm; having excellent communicate skills, can accurately and clearly explain the key points and views; with excellent team spirit.

4. Reflection

Through the teaching practice, the author found that the PBL teaching method is feasible in the high voltage technology class, also by the student's welcome, but has some problems, is worth us to reflect.

4.1 PBL Teaching Mode is More Demanding for Teachers

Most teachers are accustomed to classroom teaching, practical ability is weak relatively. In the course of PBL teaching, the teacher should be both a expert and a guider[Zhang et al., 2014]. This has a greater demand for teachers' knowledge, professional level and ability of classroom management. Therefore, we need to specify the high teaching level, high teaching and scientific research experienced teacher as the charge of the course, formulate a scientific and reasonable course construction and implementation plan, there are plans to develop the teachers' innovative education ideas and teaching ideas. Teachers use network to communicate with each other or visit the university which successful implementated the PBL teaching mode, organize teaching research meeting and exchange teaching experience regularly, learn from the successful experience, to update and modify the teaching methods, to build a group with knowledgeable, high engineering ability, high teaching level, which is enough to cultivate excellent engineers.

4.2 PBL Teaching Mode is More Demanding for Students

The PBL teaching mode requires students to have self motivation, independent study, and the new construction of knowledge to solve complex problems, and to monitor and reflect the process of solving problems. That put higher requirements to learning ability and autonomy of our students. In the teaching practice, the author finds that many students are accustomed to the "passive" learning, so they have a strong dependence on the learning stage, such as access to information, group discussions and results reporting, the time to prepare previously is greatly exceed the normal classroom learning, the expected teaching effect have a certain gap between objective.

5. Conclusion

"Excellent engineer education and training program" is a new concept of engineering education. In this paper, the implementation of PBL teaching method in high voltage technology, students reflect good, this method not only updated the teacher's educational ideas, innovative teaching mode, and the students learning way from passive to active, to cultivate the students' problem solving ability, knowledge acquisition ability and team cooperation ability, help to achieve the goal of outstanding engineers training. However, the implementation of PBL teaching method is inseparable with students' active cooperation, how to make more students to actively respond to the PBL teaching method, directly related to the implementation of the PBL teaching method. Therefore, teachers need to improve their overall quality continuously, to give full play to the personal charm, to guide students participate in the PBL teaching of high voltage technology actively, so that the PBL teaching method can achieve better teaching results.

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