



Research on Teaching Design of Professional Background Courses Based on PBL Teaching Mode

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Abstract. Problem-based learning (PBL) is a new learning method that originated from American medical education in the mid 1950s. The core idea of PBL is student-centered, emphasizing the use of knowledge and skills to solve practical problems, so as to achieve the learning process of constructing experience. PBL mode is introduced into the teaching of professional background courses. This paper puts forward the corresponding reference scheme from the aspects of teaching process design, engineering thinking training and problems to be grasped.

Keywords: PBL teaching mode · professional background courses · teaching design

1 Introduction

In the reform of the training model of military academies since 2017, the training model of growing cadres in military academies has been adjusted and reformed to an integrated training model of “pre-vocational training majors + undergraduate education majors”. According to the combination of general courses and professional courses, the curriculum system is constructed with the framework of “cultural, military and political foundation + professional background + first appointment”. In this training system, professional background courses play the role of bridge and link. Introducing modern educational concepts, strengthening professional background teaching design research, and cultivating junior commanding talents with engineering thinking and innovation ability in the new era are not only the inevitable requirements for colleges and universities to implement the major strategic thinking of President Xi to strengthen the army, but also President Xi’s idea of accelerating the cultivation of high-quality new military The important instruction of talents is also an urgent need to promote the reform and development of military higher education and improve the quality of “integrated” training. PBL (problem-based learning) originated from the medical education reform in the mid-20th century. It is a teaching mode developed based on constructivism theory [1]. It emphasizes learner-centredness, allowing them to solve problems in small groups. Authentic, curriculum-based, interdisciplinary challenging questions. The main characteristics are: problem, situation, autonomy, inquiry, cooperation, reflection and

evaluation diversity [2–5]. The PBL mode advocates creating situations with the help of teaching methods such as problem-finding method and task-driven method [6], guiding students to find, analyze and solve problems together through cooperative learning with the help of situations, forming a general method to solve problems, helping students realize the problems of knowledge construction and cultivating their problem thinking. Therefore, integrating PBL teaching mode into the teaching design of professional background courses [7, 8] is helpful to stimulate students' desire for exploration and knowledge to the maximum extent in an equal and relaxed learning atmosphere, and cultivate students' thinking of being brave in exploration and innovation in the face of complex and changeable environment.

2 The Teaching Characteristics of Professional Background Courses

The professional background courses in military colleges and universities have basic similarities with the undergraduate courses in local colleges and universities, both of which enable students to learn the basic theoretical knowledge of related majors and cultivate their innovative consciousness. However, there are great differences between them. The most fundamental difference lies in the training goal. The training goal of undergraduate majors in local universities is to train engineering and technical talents, while the ultimate training goal of military academies is to train junior commanding talents. For example, the professional background courses in military academies have the following characteristics.

First, the learning time of professional background course knowledge is short. At present, military higher undergraduate education should not only learn ideological and political, scientific and cultural, military foundation, but also learn skills courses such as command, management, combat, etc., and the time to learn professional background courses is very short. Second, the professional knowledge of engineering technology is more basic. The positions of the trainees trained in military higher education are very specific and belong to planned distribution with indicators, so higher requirements are put forward for the trainees' professional ability. Third, Talent cultivation pays more attention to the improvement of thinking ability. With the development and change of the war form, the proportion of scientific and technological factors in the factors of winning the war is increasing, and the structural principle of weapons and equipment is becoming more and more complex, and it is developing towards unmanned, intelligent and systematic direction. The technical working ability cultivated in the past can no longer meet the requirements of the application of weapons and equipment in future operations. Commanders in the new era should pay more attention to the cultivation of engineering thinking, so that they can analyze and study the mechanism of winning the war from the scientific and technological mechanism. It is a skill transfer to analyze and study the winning mechanism of combat from the mechanism of science and technology. The ability of this skill transfer is the embodiment of engineering thinking, and it needs systematic cultivation and training to be formed. The teaching system of professional background courses is set up to cultivate this engineering thinking and the ability of this skill transfer.

Based on this, the professional background courses in military academies need the innovation of teaching mode. PBL teaching mode advocates using teaching methods such as problem-finding method and task-driven method to create situations, guiding students to find, analyze and solve problems through cooperative learning with the help of situations, and finally helping students to actively realize the construction of knowledge. It can stimulate students' desire for exploration and knowledge to the maximum extent in a short teaching time, and cultivate students' thinking ability by thinking about problems.

3 PBL-Based Teaching Design Process of Professional Background Courses

3.1 Demand-The Purpose of Learning

Learning needs analysis is the beginning of teaching design of professional background courses. It is mainly aimed at students' learning situation, personal expertise and understanding of equipment. Before the class starts, it is sorted out through seminars and questionnaires, and intelligent software is used to do data analysis and summary. According to the students' comprehensive situation, in order to achieve the teaching purpose, a scientific and reasonable teaching design scheme should be formulated to prepare for the follow-up teaching implementation.

3.2 Question-The Starting Point of Learning

What is a problem? It is a stimulating situation in which some obstacles need to be overcome between the given information and the goal, which is organically combined by three parts: given, goal and obstacle. All the learning contents of students are structured with questions as the main axis, which can be asked by teachers or students. Therefore, the second step is to combine students' learning experience, professional foundation, etc., and design different questions according to the characteristics of teaching content. In teaching, students can actively think about problems and actively participate in interaction, arouse their strong thirst for knowledge, and maximize their interest in learning.

3.3 The Pre-process of Discussion-Learning

At this stage of discussion, on the basis of creating problems, teachers consciously divide students of different levels and categories into study groups according to the principle of "homogeneity among groups and heterogeneity within groups", so that the level of groups is similar and there is competition, and the organizational abilities of group members are complementary. For example, according to the types of students, soldiers and young students, students with equipment experience and students without foundation can be reasonably matched. Take the group as a unit, combine the questions raised by the teachers, and through consulting relevant materials, watch the micro-classes for study and discussion, and form opinions and learning results within the group.

3.4 Communication-The Post-learning Process

Each group uses mind map or selects a representative to share the opinions and learning results in the group in combination with PPT. In the process of sharing, students can know and analyze problems from different angles, and learn about different solutions to problems. Therefore, through communication, students can apply in new situations and get new cognitive results, and their learning presents a process of circular rise. The ideal effect is to generate new problems, arouse students' thinking and cultivate students' awareness of problem thinking.

3.5 Evaluation-The End of Learning

The evaluation of PBL-based instructional design should integrate students' ability to solve professional knowledge, process performance and teachers' reflection on the teaching process. Specifically, it includes asking questions before class (10%), questionnaire survey (10%), teacher's self-evaluation (accounting for 25%), student's self-evaluation (accounting for 25%), and group mutual evaluation (accounting for 30%). Through evaluation, we can fully understand the problems existing in the teaching process, find out the gaps, check for omissions and make up for vacancies, and make targeted improvement and optimization.

4 Problems to Be Grasped in PBL Teaching Design

4.1 The Core Link "Problem" of PBL

From the name and definition of PBL, it is not difficult to understand that its core link is "problem". However, what is the meaning of problems, how to ask and solve them, what skills and knowledge are needed to solve them, etc., all of which will affect the effect of problem-based learning mode. Without in-depth thinking and analysis of this series of problems, it is impossible to truly understand and apply PBL teaching. For example, in the subject of frequency hopping technology in professional background courses, we focus on how Heidi Rama invented frequency hopping technology against German radio interference during World War II, and set up three sub-questions: how to jump, how to jump according to what rule and how to accept it, so as to guide students to explore continuously from basic theory to technical principles, and then to equipment application, and cultivate students' problem awareness, critical thinking and practical ability to solve problems.

4.2 The Basic Link of PBL is "Self-study"

In local colleges and universities, the commonly used PBL teaching mode does not require students to study by themselves before class. It is a misunderstanding to think that PBL is limited to classroom progress. For students who are exposed to PBL teaching for the first time, the instructor should inform the students what PBL is, what preparations should be done, and how to actively participate in PBL. In practical application, teachers should use various means such as teaching preparation meetings and campus networks

to put forward self-study requirements. During PBL teaching in the classroom, if there is no sufficient self-study, the discussion will not be possible, especially for the teaching of professional background courses on the principles of weaponry and equipment construction. Therefore, students must do a lot of active pre-class reading in a variety of ways, which is an important basis for their active participation in class discussions, and is also a direct factor in the effect of PBL teaching. The self-study before the class has laid a good theoretical foundation for the PBL discussion in the classroom, and also greatly saved time, so that the discussion can be carried out more fully. On the premise that the students have the knowledge and preparation, the enthusiasm of the discussion is also greatly enhanced. PBL teaching The effect can be significantly improved.

5 Conclusions

Background courses are professional basic courses, most of which are basic and theoretical. Under the traditional teaching mode, the teacher is the center, “scripted” and “crammed”, only paying attention to imparting basic knowledge to students, but neglecting the cultivation of ability and quality. PBL teaching design pays more attention to the learning of practical knowledge, that is, learning the knowledge necessary for practical work. Of course, learning knowledge and solving problems complement each other. Knowledge is the premise of solving problems, and students can further understand existing knowledge and learn new knowledge while solving problems. For example, in the teaching design of professional background courses, we take the typical weapons and equipment as clues, learn from the military requirements and equipment construction principles in series, penetrate each other, and achieve mastery through a comprehensive study, and set up reasonable problems with how to realize the functions of weapons and equipment as the main line. By constantly regenerating new problems, driving new tasks, we push them forward layer by layer, interlocking with each other, and solve the key points and difficulties of teaching from shallow to deep, from easy to difficult, and from the outside to the inside. Let the trainees closely solve the practical problems of weapons and equipment, and accept a complete engineering thinking path training. In the process of solving problems, students not only learn the necessary knowledge, but also acquire the correct engineering thinking ability.

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