

A Study of Problem-Driven Learning Strategies in the PBGS Teaching Model for Graduate Students in Applied Mathematics

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Abstract:

In order to further promote the orderly teaching of postgraduate students of applied mathematics, it is necessary to actively build up the PBGS teaching mode, gradually achieve innovation and reform of postgraduate education of applied mathematics through the PBGS teaching mode, and promote each teaching link with problem-driven orientation, guiding students to engage in exploratory learning, thereby achieving the goal of improving the level of postgraduate education of applied mathematics. Therefore, in this thesis, the connotation of PBGS teaching mode is analyzed, the advantages of introducing PBGS teaching mode into the teaching of graduate students in applied mathematics are explored, and the problem-driven teaching countermeasures are proposed to attract attention to the problem.

Keywords:

Applied Mathematics, Postgraduate Students, PBGS Teaching Mode, Problem-Driven Learning

1. Introduction

In promoting applied mathematics education, the education of postgraduates needs to focus on innovative teaching mode to promote orderly progress in each educational link, stimulate students' learning motivation and enthusiasm, and cultivate students' innovative thinking and practical abilities. Therefore, it is necessary to construct a problem driven PBGS teaching mode in graduate education of applied mathematics, guide graduate students to learn, and achieve the educational effect of improving education quality, and cultivating graduate students' self-learning and lifelong learning abilities.

2. Analysis of the Connotation of PBGS Teaching Mode

PBGS teaching mode is the acronym of English Project-Based Group Study, which is a learning mode based on teamwork. The focus of this model is to use projects as

the starting point to guide students to complete projects through teamwork. The whole teaching arrangement and curriculum design are centered around learning projects, thus constructing an exploratory form of task driven classroom teaching, which not only stimulates students' learning initiative, but also effectively cultivates their independent exploration and self-learning abilities. The core of the PBGS teaching model is "project" and "team", where "project" refers to solving a series of interrelated tasks within a certain period of time to achieve specific projects related to reality, in order to promote cooperation and communication among student groups, and jointly promote learning progress. "Team" refers to the collaboration between individual students to achieve common learning goals and form a team to solve a homework problem, enabling them to take initiative and creativity in the research process, cooperate with each other, explore together, and ultimately complete the exploration and analysis of the entire project. The whole process of exploring learning also cultivates students' practical ability, innovation ability, teamwork spirit and self-management ability, which helps to promote the formation of students' innovative thinking and lifelong learning ability.

3. The Advantages of Introducing PBGS Teaching Mode into Applied Mathematics Graduate Teaching

In promoting the teaching of postgraduate students of applied mathematics, teachers are required to scientifically plan and design their teaching work, committed to improving various teaching modes, ensuring the smooth and orderly progress of applied mathematics professional education, and achieving the goal of improving the quality and level of educational work. The integration of PBGS teaching mode is an innovative initiative, which not only helps to stimulate the motivation and subjective initiative of postgraduates, but also enables them to form good teamwork skills in learning, so as to complete the teaching tasks of postgraduates in applied mathematics with higher quality. Generally speaking, the advantages of introducing PBGS teaching mode into the teaching of postgraduates in applied mathematics are reflected in the following aspects:

Firstly, enhancing the practicality of the teaching process: It is of vital significance to enter the PBGS mode in the teaching of postgraduate students of applied mathematics, through which the PBGS mode can help to enhance the practicality of the teaching process, so as to improve the practical ability and operation level of the students. In the PBGS model, more emphasis is placed on the practicality and applicability of the project, guiding students to think through the introduction of practical problems during the project promotion stage, so as to better understand and apply mathematical theoretical knowledge during the project completion stage. This also enables students to complete the internalization and externalization process of mathematical theoretical knowledge, improving their ability to solve practical problems. In addition, promoting the teaching of graduate students of applied mathematics based on the PBGS model fully meets the relevant teaching requirements of professional practice, can better meet the social demand for applied mathematical talents, and improve the teaching level and quality of graduate students of applied mathematics.

Secondly, promoting self-directed learning ability: The advantage of integrating the PBGS teaching mode into the teaching of postgraduates in applied mathematics lies in promoting students' self-directed learning and exploration, which is of positive significance to the cultivation of students' awareness of independent learning and the

formation of lifelong learning ability. In the stage of promoting the PBGS teaching mode, a student-centred teaching mode can be formed, and students can independently complete the relevant learning projects under the guidance of teachers. Students can push projects through processes such as data collection, project analysis, project planning, and project problem organization. The whole process not only strengthens students' independent learning ability and self-management ability, but also enables students to learn how to apply mathematical theoretical knowledge in practical projects, which is greatly beneficial for students' future learning and work, and also makes them more adaptable to the competition and development needs of future society.

Thirdly, exercising students' teamwork ability: the integration of PBGS teaching mode in the teaching of postgraduate students in applied mathematics helps to improve students' teamwork ability, which is an indispensable ability in the process of lifelong learning, and is of vital significance to the promotion of students' comprehensive development and the enhancement of mathematical practical abilities. In the stage of promoting the PBGS teaching mode, teachers often set tasks in the form of the entire teaching process, and students will also play different roles and undertake different team tasks when completing projects. The process of students working with each other to complete the project also enhances the communication and cooperation among students, gradually forming a sense of teamwork, cultivating students' teamwork spirit and communication skills, which is essential for improving students' comprehensive development and enhancing their practical ability in mathematics. And communication skills can have a positive impact on improving the professionalism and comprehensive abilities of student groups.

Fourthly, cultivating students' innovative thinking: the introduction of PBGS teaching mode in the teaching of postgraduate students of applied mathematics helps to cultivate students' innovative thinking, which is one of the important advantages of PBGS teaching mode, and has become the core and key to promote the innovation and reform in postgraduate students' teaching of applied mathematics. In the PBGS model, it is advocated to encourage students to actively explore, discover, and solve problems. In active exploration, students can actively sort out and think about the problems in the project and the context of completing the project, and then solve the problems through their own comprehensive analysis and the process of finding data after discovering problems. The entire process not only highlights students' autonomy, but also helps to promote the formation of innovative thinking. [1] Moreover, during the process of completing the project, students can continue to think and explore knowledge in the field of mathematics, constantly try and revise the upcoming learning project, which not only exercises their innovative thinking but also helps stimulate students' creativity, thereby improving the level and quality of graduate education in applied mathematics.

4. Problem-Driven Learning Strategies in the PBGS Teaching Model for Graduate Students in Applied Mathematics

4.1. Adhere To The Problem Orientation, Do a Good Job Of Creating Problematic Situations

In the education of postgraduate students of applied mathematics, the construction of the PBGS model is an innovative initiative, which helps to improve the effect of

classroom teaching through the construction of the PBGS model, and at this stage, we should pay attention to the practical implementation of the problem-driven learning, so as to enable the students to adhere to the problem-oriented learning of mathematical knowledge, and strengthen the students' ability to think and explore the problems. Therefore, teachers need to take into account the actual situation of graduate students, such as the basic mathematical ability, thinking level and other factors of creating problem situations to guide students into the problem-solving state. Moreover, in the stage of creating problem situations, teachers should aim to stimulate students' interest and curiosity, encourage them to actively participate in problem-solving, and complete learning projects more actively. First of all, in the process of creating problem situations, teachers should aim to stimulate students' interest and curiosity, encourage them to actively participate in problem-solving, and complete learning projects more actively. [2] Secondly, the teacher creates the problem situation to pay attention to the combination of the actual application of the scene, so it is necessary to fully integrate the problem with the practical application of the situation. By simulating the practical application of the situation, students can have a deeper understanding of mathematical knowledge and its practical value. For example, teachers can integrate some of the actual mathematical problems from life scenes, cases or data into the problem situation creation, so that students can be placed in the problem situation to think about the solution to the problem. Then, by creating problem situations, students can be stimulated to learn and explore, laying a solid foundation for successfully completing their learning plans and learning.

4.2. Strengthening Teaching Leadership, Task Decomposition And Learning Path Planning

In order to promote the teaching innovation of postgraduate students of applied mathematics, we need to devote ourselves to the construction of PBGS teaching mode, gradually realizing problem driven teaching process through PBGS teaching method, so as to let students explore mathematical knowledge with problems as the starting point. Therefore, teachers need to strengthen the teaching leadership in teaching, so as to decompose learning tasks, and help students plan their learning paths, so that students' learning of mathematical knowledge can proceed in an orderly manner. [3] For example, teachers need to decompose complex mathematical problems in order to set corresponding learning tasks for students based on the decomposition of mathematical problems, and require students to form a clear learning path during the development stage of completing learning tasks, so that students can exercise their mathematical abilities and improve the teaching effectiveness and quality of graduate students of applied mathematics. For example, in the task decomposition stage, it is necessary to formulate a task list, including the specific content of the tasks that students need to complete, the task requirements, and the time schedule of the task, in order to facilitate the students to follow the task list to gradually promote the progress of the task. At the same time the decomposition of the task process also allows students to understand the essence of the problem and the relevant requirements, to enhance the quality and effectiveness of mathematics teaching. Moreover, during the dominant stage of teaching, teachers should also focus on helping students to clarify their learning paths, including the integration of learning resources, the improvement of learning methods and the formulation of learning plans, so that students can gradually complete the tasks according to their own learning needs and mathematical foundations. Throughout the whole teaching process, we aim to achieve a problem driven approach, promote student completion of tasks, and deepen their understanding

of mathematical problems while completing tasks, thereby achieving the goal of improving the quality and level of graduate education in applied mathematics.

4.3. Enriching Learning Resources And Guiding Students To Strengthen The Use Of Learning Resources

The comprehensive utilization of learning resources is the key to promoting students to explore mathematical problems, as well as gradually solving problems and completing learning tasks. In order to enhance the teaching effect of PBGS model for graduate students of applied mathematics, teachers need to focus on promoting the enrichment of students' learning resources during the teaching stage and guiding them to strengthen the utilization of learning resources. [4] In this process, teachers also need to focus on highlighting the main teaching idea driven by problems, in order to raise the problem as the core for the students to set up learning tasks, and then require students to learn resources integration, such as textbook resources, reference book resources, network learning resources, etc. Through the full integration of learning resources such as the above, it can help students expand their ideas, make them learn independently while exploring problems, and enable them to find methods and paths to solve problems with the support of abundant learning materials, so as to achieve the educational effect of improving students' comprehensive ability. In addition, the use of learning resources can also strengthen students' independent learning ability information literacy and resource integration ability, which can help promote the development of students' comprehensive quality.

4.4. Implementing Evaluation Feedback to Promote Students' Learning Evaluation and Reflection

In order to improve the effectiveness and quality of graduate education in applied mathematics, it is also necessary to implement evaluation and feedback during the teaching stage. Through the evaluation and feedback results, students can promote self reflection and self summary, so that the PBGS teaching mode can give full play to its role and value, and help improve the students' comprehensive mathematical ability and level. For example, teachers need to establish an effective learning evaluation mechanism to provide timely evaluation and feedback on the completion of students' learning projects, the process of learning exploration and the results of the projects. They also require students to carry out self-evaluation and self-reflection after the completion of the projects, summarize the experience and lessons learned during the completion of the projects, so that students can identify their own shortcomings and make effective corrections, and promote students to continuously improve the quality and level of their learning. [5] In the development stage of teaching evaluation mechanism, teachers should do a clear evaluation criteria, such as student learning process evaluation, learning achievement evaluation, team cooperation evaluation, communication skills evaluation, etc., in order to ensure the comprehensiveness and objectivity of evaluation results. At the same time, they should attach importance to the evaluation of feedback results, comprehensively use evaluation feedback results as the basis, promote the improvement of subsequent PBGS teaching mode, and achieve the effect of improving the quality of applied mathematics professional education.

4.5. Strengthening Collaborative Mutual Assistance And Guiding Students To Carry Out Cooperative Learning

The PBGS teaching mode should focus on guiding students to carry out collaboration and mutual assistance, so that students can gradually advance their learning projects in cooperative learning, and then achieve the educational effect of improving comprehensive ability. In the stage where teachers assign learning projects to students, they need to focus on highlighting the problem orientation, so that each group of students can carry out cooperative learning while exploring the problem. First of all, teachers need to help students establish a cooperative learning group to ensure that each group is composed of students from different backgrounds and characteristics, enabling students to communicate, learn from and assist each other. Each group member should do a clear division of labour, so that students can work together to promote the learning task. [6] Secondly, it is necessary to fully clarify the tasks of each group. At this stage, it is necessary to ensure that the task set has a certain degree of challenge and openness, and through the setting of the problem, it can stimulate mutual cooperation and help among students, so that students can inspire their thinking and grow together when exploring problems. Finally, teachers should attach importance to establishing collaborative learning platforms, guiding students to engage in online collaboration, mutual assistance, communication, and sharing through learning modules such as online collaboration tools and communication forums, thereby promoting the sustainable optimization of student collaboration abilities and improving the effectiveness and quality of applied mathematics graduate education.

5. Conclusions

In summary, in promoting graduate education in applied mathematics, teachers need to actively build up the PBGS teaching mode, gradually improve the teaching process through the PBGS teaching mode, and exercise students' cooperative learning ability and independent exploration awareness. In order to ensure the orderly progress of the whole teaching process and stimulate students' subjective initiative of cooperative exploration, teachers need to implement the problem-driven teaching form, so that students can actively participate in mathematical problem exploration under the drive of the problem, so that they can gradually cultivate innovative thinking and teamwork ability in the process of completing tasks, and achieve the goal of high-quality completion of applied mathematics graduate education tasks. The goal is to achieve the high quality of postgraduate education in Applied Mathematics.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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