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Constructing the Training Mode of Systematic Thinking and Realizing the Educational Values of Higher Mathematics

Wu Hongye

School of Mathematics and Statistics, Huizhou University, Huizhou, P. R. China

Email address:
396944167@qq.com

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Abstract: Under the background of popularization of higher education, more and more college students who are not good at reading enter local colleges. These college students are characterized with high reading enthusiasm but poor learning methods. They can earnestly complete the tasks assigned by teachers, however, they can not be flexible to solve problems with slight changes. And after graduating from college, they often can't solve the life problems well, and therefore fall into a life predicament. In the face of these college students, if the higher mathematics teachers can give proper guidance to enable them to master scientific learning methods and thinking methods while completing classroom knowledge teaching, the higher mathematics teachers will greatly promote the growth of college students and contribute to the development of local colleges and the social stability. However, most local colleges at present still adopt the indoctrination teaching mode in higher mathematics teaching which pays attention to knowledge teaching, and ignores the hidden educational value of knowledge and the guidance of learning methods and thinking methods. Facing this teaching malpractice in local colleges, the paper attempts to explore an effective way to realize knowledge mastery and educational value simultaneously. First of all, according to the reality of college students, the paper puts forward the higher mathematics teaching goal which is to realize the educational value of rational thinking exercise, humanistic spirit training and innovation awareness stimulation through the training of three thinking modes. Secondly, the paper presents four effective ways such as learning objectives, studying methods, teaching modes and evaluation methods to realize the above educational values.

Keywords: Higher Mathematics, Educational Value, Realizing Way

1. Why Talk About the Educational Values of Higher Mathematics Curriculum

Higher Mathematics is a public basic course for science and engineering majors. It plays an important role in college students' four-year study. On the one hand, students have more confidence and ability to learn Higher Mathematics compared with other professional courses because students have learned some contents of Higher Mathematics in middle school. And the high-quality learning of Higher Mathematics can greatly promote college students to learn other courses. On the other hand, this course provides students with a lot of opportunities to develop students' rational thinking. A good learning of Higher Mathematics is helpful to improve rational thinking of freshmen who are in the critical period of rational development [1-7], and helps college students better adapt to college' lives. Therefore, advanced mathematics teachers are able and urgently need to do well in the teaching of this course, so as to promote college students adapt quickly to college lives and lay a solid foundation for students' further study in college.

2. What Are the Educational Values of Higher Mathematics in This Paper

Higher Mathematics have many educational values. This paper only focuses on its educational values of thinking training, humanistic spirit cultivating and innovative consciousness improving, which are urgently needed by the times and students. Through the complete and strict training of thinking modes, students' thinking ability, reflection spirit and innovative consciousness can be improved in Higher

Mathematics learning. The thinking modes mainly refer to the thinking mode of self-awareness:“ first analyses the thing’ benefit and harm to oneself, then analyses the thing’ right and wrong to the social or others, last analyses oneself’ likes and dislikes to the thing”, the basic learning thinking mode: “when finding problems (facing things), first observe and analysis the problems (things), then find methods or ideas to solve them, next begin to solve the problems (things), last summary and reflect the process ... until problems (things) are safely and completely solved (accurately, clearly and completely understand things)", and the innovative thinking mode of discovering, raising, analyzing and solving problems. The training of thinking mode is particularly useful for college students in local colleges.

According to a large number of documents and practical teaching, it is found that there are many deficiencies in the thinking of local colleges’ students who grew up under the traditional indoctrination teaching mode. These deficiencies are mainly manifested in the following aspects. Many students in local colleges are at a loss for questions that have changed slightly or have not been seen. The mistakes in their homeworks or test papers are not carefully corrected by theirselves, and they will not find effective ways to solve problems that they do not understand by themselves. For them, it is difficult to find problems in the process of learning, and they are no habit of asking questions and thinking deeply, etc. [8-12]. These phenomena comprehensively reflect that college students have insufficient self-awareness, weak autonomous learning ability, lack of self-examination, weak innovation ability, and lack of the research spirit.

With the effective training of three thinking modes in higher mathematics teaching, higher mathematics teachers can help college students correct the above-mentioned thinking problems. By guiding students to analyze thing’ benefit and harm to oneself, then analyze thing’ right and wrong to the social or others, last analyze oneself’ likes and dislikes to the thing, higher mathematics teachers can promote students to form a good thinking mode of self awareness, to better understand themselves, to clarify their learning goals, to adapt to college life more actively. By guiding students to complete their homework accurately and completely, and emphasize the necessity and importance of observation, analysis, summary and reflection, Higher mathematics teachers can promote students to form a basic learning thinking mode, and help students form a complete thinking mode of solving problems (understanding things). At the same time, the guiding students in observing, analyzing and reflecting well is conducive to students' mastering scientific learning methods and forming a rigorous learning attitude and humanistic spirit of reflection on life. By guiding students to pay attention to, propose, analyze and solve a large number of problems in their study and life, higher mathematics teachers can promote students to form an innovative thinking mode, to stimulate students' problem awareness, to form the habit to analyze and solve problems, and to cultivate students' innovative spirit, courage and strong will to overcome difficulties [13].

3. How Effectively Realize the Above Educational Values

Mathematics is the gymnastics of thinking, and the cultivation of students' mathematical thinking quality is the breakthrough of developing students' intelligence. In addition to cultivating students' thinking quality through ways such as teaching in class, dialogue between teachers and students, questioning and reflecting, teachers can also establish or reform learning objectives, learning methods, teaching models and evaluation methods to promote students’ development and realize the educational value of Higher Mathematics.

3.1. Thought Guiding and Goal Orientation

Owing to the bad influence of the examination-oriented education, many freshmen are used to the indoctrination education mode, and they are not used to the way of teaching and learning at university. Some college students lose their learning direction, and some college students even indulge themselves. The ancients said that the point where to rest being known, the object of pursuit is then determined; and, that being determined, a unperturbed calmness may be attained to; to that calmness there will succeed a tranquil repose; in that repose there may be careful deliberation; and that deliberation will be followed by the attainment of the desired end. In the classroom teaching of Higher Mathematics, teachers should apply the systematic thinking mode to let students know and understand the objectives of teaching and learning which is studying combined with asking, doing and insight (cold mathematics, hot thinking, perfect practice, happy life), and more detailed teaching objectives that are to establish the above three thinking modes, to improve the thinking method, to optimize the thinking quality, and to form the habit of asking everything, and to exercise strong will and strong ability through solid knowledge learning [14-15].

The establishment of above learning objectives of Higher Mathematics are helpful to guide students to understand the life significance of math learning which make students realize math learning is valuable and form a motivation and interest to learn mathematics. In this way, students are more willing to accept hard training on mathematical learning, take the initiative to learn cognitively and emotionally and continue their study. Finally college students understand themselves better, adapt to college life quickly, form a more serious and more responsible learning attitude, and self-confident and decisive personality.

3.2. Learning Method Guiding and Multiply Infiltrating

The final formation of students’ three thinking modes and strong learning ability cannot do without the guidance of scientific learning methods. The scientific learning method mentioned here refers to the systematic cognitive method of combination of theory and practice which based on epistemology, as well as the efficient learning method based on psychology. Due to the actual condition of local college students and the complexity of scientific learning methods, it is

not easy for local college students to accept and finally form these scientific learning methods. Therefore, in addition to teaching knowledge about scientific learning methods in class, higher mathematics teachers need also using a variety of teaching methods to guide students to apply scientific learning methods to learn math, to activate students' brains, and to promote scientific learning methods mastered by students. There are many teaching methods to promote the growth of students in local college. The viewing the videos that classmates or seniors explain math problems can help students with lower scores intuitively feel the scientific learning method of theory with practice. The innovative teaching modes can guide students to flexibly and rationally treat teaching learning. The diversified evaluation methods can guide students to look at learning in depth and help them form good learning habits.

3.3. Mode Innovation and Thinking Training

In addition to ideological guidance and infiltration of learning methods, teachers also need innovate teaching models to promote local college students to correct existing thinking problems and form good thinking habits and thinking quality. The innovative teaching modes includes the problem teaching mode of "questioning-teaching-doing classwork-after class reflecting". The problem-based teaching mode strengthens independent learning and learning combining with asking through preclass questioning, guide students to intuitively feel the systematic thinking mode through the demonstration teaching, exercise innovative thinking mode in classwork and reflection. By persisting in strict training for a long time, college students in local colleges may form better observation, analysis and reflective and critical abilities, and finally master solid mathematical knowledge and scientific learning methods.

3.4. Detailed Evaluation and Implementation Effect

In order to realize the teaching objectives, it is necessary to formulating reasonable and scientific evaluation ways to make college students better growth. Such evaluation methods include the summative evaluation and the formative evaluation. The main basis of summative assessment is the final examination results. The main basis of formative assessment includes students' homework, attendance, autonomous learning, team learning, chapter testing, classroom performance, etc. Autonomous learning mainly records students' active learning such as completing homework in advance, pre-class questioning and homework' correction. Team learning mainly records group cooperative learning combining with questioning, doing and understanding. Classroom performances mainly records students' classroom questioning and answering, etc. The good evaluation methods may prevent students form passive learning, temporary cramming at the end of the term, and bad learning practices that are not good at learning from each other, promote students to develop good learning habits of autonomous learning, cooperative learning, and paying attention to daily learning, stimulate college students' internal learning motivation, humanistic spirit and innovative consciousness, and promote college students to improve theirselve's thinking ability and master scientific learning methods.

4. Summary and Deficiency of the Study

Based upon the reality of college students' learning situation in Local University and the characteristics of Higher Mathematics Curriculum, the paper discusses how to promote college students' ability and quality with the help of higher mathematics teaching. The paper proposes three thinking modes including self recognition thinking mode, the learning method of combinating with study, ask, do and insight, and four teaching improvement approaches including teaching organization and evaluation methods. The paper illustrates the teaching measures of training college students' rational thinking, cultivating college students' humanistic spirit and innovative consciousness in combination with specific teaching practice. According to the author's experience and learning, if the above practices are strictly implemented, it will promote freshmen to better adapt to college life, and improve their ability. However, the practical implementation of the above measures not only requires teachers to devote themselves to teaching, but also requires strong support from the school leader level. Only good teachers with a solid foundation of mathematics knowledge and in-depth study of teaching can be received by students cognitively and emotionally, and only teachers with strong support from school leaders can dare to constantly break through the limitations of existing teaching, adhere to innovation, and realize the great transformation of teaching mode. In addition, teachers must pay attention to the inspiration and systematization of Higher Mathematics classroom teaching, pay attention to the orderly and effective organization of teaching and timely summary of teaching. In this way, Higher Mathematics teaching can better complete the established teaching objectives.

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