

How to Take Advantage of Higher Mathematics to Solve Real-Life Problems

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Abstract. With the rapid development of science and technology in today's society, research and development of various techniques are closely related to the practical application of mathematical knowledge. The phenomenon of the application of advanced mathematics knowledge to solve practical problems of life has become even more common, getting widespread attention in the community. This article puts forward the corresponding improvement measures and analyzes the practical application of advanced mathematics in life with specific teaching cases from the development limitations of using higher mathematics knowledge to educational practice in current Chinese universities, in order to provide some support for the development of advanced mathematics research.

Introduction

Affected by the importance of higher Mathematics, many colleges and universities take higher mathematics as a basic compulsory course for students and wish students to cultivate their mathematical literacy, logical thinking ability through learning through higher mathematics, laying a solid foundation for the future development of students. In all existing relevant disciplines, mathematics as the first discipline is the foundation for all other disciplines to develop and in-depth research. Thus, higher mathematics teaching can not only have an impact on developing students' comprehensive abilities and expanding their thoughts, but also can help students solve various practical problems encountered in daily life. It is a knowledge utility appliance. However, we should note that currently our higher mathematics education is relatively backward, there are some problems in developing students' knowledge application ability, to some extent lead to students can't timely apply mathematical knowledge to solve practical problems in life, adversely affect the overall development of the students. So mathematics teachers in higher education should strengthen to apply knowledge of advanced mathematics to solve their problems in this educational philosophy importance to and actively take certain measures to enhance students' knowledge of mathematics application ability, laying a solid foundation for the future development of students.

The current existing limitations of developing students' knowledge application ability of higher mathematics

The student subject

Without a doubt that students are the important subject in the Higher Mathematics Teaching activities. From the history of the development of higher education and the future trend of development, our higher education gradually from elite education to mass education, the main teaching activities - specifically the number of students has also gone the surge phenomenon, by 61 million in the early 1990s, the development of 221 million in 2000, then in 2010 over 600 million people, many college students realize their own dreams to get the opportunity to receive higher education. But at the same time, accompanied by a surge in the number of the student body, higher mathematics teaching activities have also been carried out to deepen a certain influence. Because of higher mathematics learning have considerable difficulty, so in Mass Education on the University campus, many students without the presence of a solid basic knowledge of mathematics phenomenon,

there are some difficulties for a deeper study on higher mathematics to develop their mathematical knowledge application ability also out of the question.

Teaching staff

In recent years, as the accumulative trend of China's development of popularization of higher education, the number of university students continue to increase, the original number of mathematics teachers can't meet the actual needs of mathematics teaching. So colleges in the absence of additional mathematics teachers often choose to squeeze higher mathematics teaching lessons to large classes taught ways to focus the students to explain the relevant knowledge points to complete the task of teaching higher mathematics, teaching effect severely affected [1]. Meanwhile, since the number of students in large classes taught relatively more, there is a huge difference among the students, teachers in the teaching process can not be differentiated instruction for different students, but also unable to communicate effectively with students and exchange, not conducive to enhance the students' learning effect. In addition, there are some universities mathematics teachers, relatively rich theoretical knowledge, but knowledge of advanced mathematics application awareness in society relative lack of real life, its own weak ability to apply mathematical knowledge to solve practical problems, therefore they can not provide proper guidance to the students , influence teaching effectiveness.

Teaching methods

At this stage, the vast majority of colleges and universities in the actual teaching of mathematics will explain the process of teaching mathematics as a key, pay attention to impart theoretical knowledge from the mathematical concept, mathematical formulas to the corresponding theoretical logic, tough indoctrination of students. The practical application of mathematical knowledge training has been neglected ,to a certain extent led the students in a passive state in the whole learning process, not only limits to stimulate student interest in learning, but also for the overall development of students had a corresponding adverse effects [2] . In this model of teaching, students generally can not actively participate in teaching activities, they can not be timely communication confusion for their own learning with teachers ,which easily lead students have learning burnout, adversely affect the effectiveness of teaching.

Teaching patterns

Affected by the traditional educational philosophy, our higher mathematics teaching generally academic talent as focus on training targets, attention to make students accumulate some basic knowledge in the teaching process, development and innovation with related mathematical theory. However ,they ignore the students' capacity and their use of mathematical knowledge to solve practical problems of life , which is not conducive to the overall development of students. Meanwhile, now a part of colleges and universities recognize the importance of developing application-oriented personnel training in educational practice and actively guide students to apply knowledge of advanced mathematics to solve real-life problems. But they go to the other extreme, the neglect of the teaching mathematics theory resulting in students can only solve some relatively simple skin problems, and have greater difficulty of the harder problem, not conducive to the overall development of students.

Measures of cultivate students' ability of solving practical problems with the knowledge of advanced mathematics

Change the basic educational concept of Advanced Mathematics

On the one hand, higher mathematics teachers should strengthen the application of mathematical knowledge to cultivate their awareness and ability to ensure the quality of teaching theory. They can actively participate in educational skills training to further enhance the practical application of advanced mathematics knowledge ability, and thus will be able to simultaneously develop themselves to be both theoretical education and practical educational skills of teachers to provide appropriate protection for the students knowledge application ability [3]. On the other hand, the student as the subject in the whole educational activities not only should seriously study the learning process in the

classroom, and actively participate in teaching activities, but also should make full use of spare time to observe life in contact with the art of mathematical knowledge and conscious use mathematical knowledge to solve real-life problems, and then gradually improve knowledge application ability, promote their overall development.

Class teaching process of innovative advanced mathematics

To get rid of the traditional mathematics teaching disadvantages, and enhance the effectiveness of classroom instruction and practice, teachers can try to apply mathematical modeling education thought to teaching practice, improving classroom teaching. Mathematical modeling simply means that through the use of mathematical knowledge concepts, symbols, etc., for real-life things first off for analysis, thus revealing the intrinsic relationship between the nature of things and things, etc., which can describe the abstract and complex Higher Mathematics social phenomenon with a logical language simple statement, that is a more practical new teaching methods. Teacher with this teaching method can really organize and guide students to apply mathematical knowledge to real life and solve practical problems, thus to stimulate student interest in mathematics learning, and strengthen its ability to apply knowledge to promote overall development of students [4]. It should be noted that in the teaching process, teachers should rational use early advanced models, so that students can master the solid foundation of knowledge, and get the ability to obtain in-depth study to create conditions for the future development .

Further enrich the basic teaching model of higher mathematics

China's traditional mathematics teaching model is somehow single, basically explaining the theory and appropriate analysis of textbook knowledge-based which has considerable limitations and limit the application of mathematics to strengthen the students to develop awareness and knowledge application ability to a certain extent . Through rich basic teaching model of higher mathematics, strengthen the importance of students' practical ability training, and through diversified forms of teaching, encourage students to gradually develop the application of mathematical knowledge to solve practical problems of habit. In actual operation, Higher Mathematics teachers of colleges should attach great importance to the basic knowledge teaching on the mathematical theory, mathematical analysis appropriate to carry out related activities and mathematics experiment activities. Regularly set the practical issues related to life for students, actively guide students to apply higher mathematics Knowledge tackle them, and ultimately complete knowledge application ability of students [5]. Each relevant knowledge of advanced mathematics can be linked to a variety of life issues, and solve every problem of life may involve a variety of mathematical thinking. So, to make the students develop real applications of using advanced mathematics to solve practical problems in life, teachers should guide students to make orders and plannings about the knowledge they get, and encourage students to deeply understand the relevant knowledge of advanced mathematics in order to create the conditions for solving their practical problems .

Application example of higher mathematics knowledge used in solving practical problems in life

The application example of the function and limit knowledge

In real life, function and limit knowledge used in solving currency and loans is fairly common. The following article will specific analysis on the common question of interest . Interest simply means that the money paid by a borrower to a lender for a lender credit or a similar liability. Under normal circumstances, the entrepreneur in society for the needs of business development will do appropriate financing combined with their own development situation and pay certain interest assume the risk of financing . In this process, the interest usual paid as the unit of "period" for clearing. Interest is also divided into two basic forms, simple interest and compound interest. Simple interest is more common in private lending, the risk is relatively large. Compound interest is interest added to the principal of a deposit or loan so that the added interest also earns interest from then on ,also the saying interest on interest.

For example: in a particular loan transaction, the principal amount is \$ 10,000, the monthly interest rate $r = 2\%$, calculate the monthly interest carried out in accordance with the simple interest $X_1 = 200$,

for a total interest rate of the year $X_{12}=2400$, while interest payments are calculated in accordance with compound interest, its annual interest rate $r = 8\%$,

In this case, at the end of the first year principal amount should be $A_1 = 10000(1 + 8\%)$

At the end of the second year principal amount should be $A_2 = 10000(1 + 8\%) + 10000(1 + 8\%)8\%$

That's to say $A_2 = 10000(1 + 8\%)^2$

By parity of reasoning, in the year N , the principle and the interest amount are $A_n = 10000(1 + 8\%)^n$

If the interest rate is $r = 8\%$, within a year the average loan period can be divided into $m = 12$, then each of the interest rate can be calculated as may be specifically drawn $A_n = 10000(1 + 8\%)^n$

In this case, unlimited reduce the inspection intervals of the interest period, that is when $m \rightarrow \infty$, at that time, you can take advantage of higher mathematics knowledge limits deduced the basic formula of compound interest $A_t = A_0 e^{rt}$, at this time e is on behalf of when the interest rate is 100%, and after continuous compounding, a dollar of principal at the end of the period and the principal and interest.

Application Examples of derivative knowledge

In a market economy deepened development of today's society, driven by the modernization productive forces, the quantitative analysis of mathematical knowledge to the field of economics has also made some progress, the application of the higher mathematics branch such as derivative knowledge, calculus equations, etc. in real life also be enhanced to solve a series of practical problems, which have an important impact on people's production and life. Taking derivative knowledge as an example, derivative can analyze a cost-benefit on economic field, can provide quantitative basis for the private sector of scientific decision-making.

For example: The total cost of a company producing a commodity required A (million), and function relationship between the remaining output x (ten thousand) is $A(x) = 1000 + 12dx - 0.8x^2 + 0.04x^3$. Calculate the company's production capacity is $x = 5$ (ten thousand) when, through the knowledge of elastic analysis and the valuable analysis providing basis for enterprise decision-makers for whether to increase production from a cost perspective.

By the condition it shows that, when production capacity $x = 5$ (ten thousand), the total cost should be

$$A(5) = 1000 + 12 * 5 - 0.8 * 5^2 + 0.04 * 5^3 = 155 \text{ (ten thousand)}$$

At this time, the average cost per unit is calculated can be drawn

$$A(5) = \frac{A(5)}{5} = \frac{155}{5} = 31 \text{ (dollar / piece)}$$

$$\therefore A'(x) = 12 - 1.6x + 0.12x^2$$

It can draw the corresponding marginal cost $\therefore A'(x) = 12 - 1.6 * 5 + 0.12 * 5^2 = 7 \text{ (dollar / piece)}$

That is, the cost of producing one product is only 7 dollar, significantly lower than the total cost. Compared with the marginal cost of goods, we can find that once increasing one production, the average product cost will be decline in a certain degree, so companies can expand production to obtain greater profits. However, in this process, in order to explore whether a company can expand infinitely costs, which require the application of derivative knowledge. We assume that the company's sales function, profit function are $B(x)$ and $C(x)$, then can be drawn through the corresponding $C(x) = B(x) - A(x)$. Through the derivative knowledge computing can be drawn, the maximum $C(x)$ should be in the position $C'(x) = 0$, that is to say $B'(x) = A'(x)$, that can be drawn, when marginal revenue equal to marginal cost, companies can get the maximum profit.

Conclusion

Application of mathematical knowledge in social life can be seen everywhere, small to human heartbeat frequency, high to the vast universe, which are closely linked with the mathematical knowledge. Therefore, colleges and universities should pay greater attention to capacity-building work of the students, and guide students to solve life's problems by knowledge of advanced mathematics. Deepen students' understanding of mathematical knowledge, while promoting the overall development of students to provide practical mathematics professionals for making the appropriate contribution in socialist modernization.

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