# Mathematical Modeling Analysis of Influencing Factors of Educational and Teaching Efficiency

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**Abstract:** as a Basic Course, Mathematics in Colleges and Universities Can Provide Effective Application Tools and Basic Mathematics Knowledge for Other Teaching Courses. Therefore, Mathematical Modeling Has a Wide Range of Applications in the Education Industry, and Plays an Important Role in Improving Teaching Efficiency. At the Same Time, with the Increasing Attention of Relevant Departments to Higher Education, the Improvement of Teaching Efficiency Has Become One of the Main Ways to Improve Education and Teaching. in This Context, It is of Great Practical Significance to Analyze the Impact of Mathematical Modeling on the Efficiency of Education and Teaching. Based on This, This Paper First Outlines the Role of Mathematical Modeling in Education and Teaching, and Discusses the Application of Mathematical Modeling in Education and Teaching, and Finally Puts Forward Relevant Strategies to Improve the Efficiency of Education and Teaching, in Order to Provide New Ideas for Follow-Up Research.

## 1. Introduction

### 1.1 Literature Review

Mathematics, as a Part of Cultural Education, is Undoubtedly of Great Importance. Liu Yujiao Believes That with the Implementation of the New Education Reform, Students Should Be Taken as the Main Research Object in Mathematics Teaching. Only by Understanding Students' Needs and Characteristics of Mathematics Can We Improve Teaching Efficiency and Cultivate Students' Mathematical Literacy (Liu, 2014). It is Suggested That Mathematics Teaching Can Effectively Train Students' Logical Thinking Ability, Learning Ability, Transaction Analysis Ability and Three-Dimensional Thinking Ability (Wang, 2015). There Are Many Assistant Teaching Methods to Improve Mathematics Classroom. the Teaching Strategy of Mathematical Modeling is One of the Most Effective Assistant Teaching Methods (Zheng, 2016). Integrating the Idea of Modeling in Mathematics Teaching Can Make Students Realize the Importance and Value of Modeling and Form a Modeling Skill in Practice, Exploration and Application. Huang Ruifang Believes That Integrating Mathematical Modeling into Mathematics Teaching Can Effectively Combine Theoretical Knowledge with Practical Problems and Improve Students' Innovative Ability and Practical Thinking Ability. Not Only That, the Idea of Mathematical Modeling Can Also Effectively Improve the Boring and Difficult Characteristics of Mathematics Curriculum, Stimulate Students' Interest in Learning, and Help Mathematics Teachers Improve Teaching Efficiency (Huang, 2016). Chen Long Pointed out That Although Most Schools Are Aware of the Importance of the Teaching Method of Mathematical Modeling, They Still Use the Traditional Mathematical Teaching Mode in the Actual Teaching Process (Chen, 2016). Zhong Ruodan Believes That the Teaching of Mathematical Modeling Can Not Only Improve Students' Logical Thinking Ability, But Also Effectively Cultivate Students' Subjective Initiative. However, There Are Still Some Problems in Mathematics Teaching, So Students Have Not Formed a Good Learning Habit, Nor Have the Ability to Apply What They Have Learned (Zhong, 2015). in Order to Improve Students' Mathematical Literacy and Comprehensive Application Ability, Many Schools Are Gradually Strengthening the Teaching of Mathematical Modeling. But At Present, the Teaching Effect of Mathematical Modeling is Unsatisfactory, and There Are Still Many Problems. the Main Reason for This Situation is That Mathematics Teachers Have Not Conducted in-Depth Research on Students'

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Learning and Cognitive Laws of Mathematical Modeling. the Cognitive Mechanism and Teaching Strategies of Mathematical Modeling in Educational Circles Are Still Blank, and There Are No Relevant Research Results. a Thorough Study on the Cognitive Mechanism and Teaching Strategies of Mathematical Modeling Will Help Deepen the Theory of Mathematical Teaching, Enrich the Theory of Mathematical Learning Psychology, and Solve the Problems Existing in the Teaching of Mathematical Modeling. It Has Theoretical Significance and Practical Value for the Development of Mathematical Education.

### 1.2 Purpose of Research

Mathematics is widely used in daily life. As the basis of simplification of social production and scientific and technological development, the importance of mathematical modeling need not be said much. Mathematics teachers can guide students to participate in the process of mathematical modeling practice through mathematical theory knowledge, let students actively think about problems, and put forward the difficulties encountered, so as to mobilize students' learning enthusiasm, let students understand the importance of mathematics in life. Mathematical modeling covers a wide range of knowledge, so it has flexibility. Students can use mathematical modeling to train themselves to think in different modes of thinking, jump out of the previous single mode of thinking, and try to solve problems in various ways, so as to effectively exercise students' innovative thinking ability. With the application of mathematics in daily life becoming more and more extensive, students should learn mathematics knowledge well and apply mathematics to life and learning. With more and more attention paid to mathematical modeling, teachers should focus on cultivating mathematical modeling ideas for students, so that students can be applied in future work, so that students have more choices. Mathematical modeling can effectively cultivate students' thinking ability and innovation ability, so it is important to study the influence of mathematical modeling on the efficiency of education and teaching.

## 2. The Role of Mathematical Modeling in Education and Teaching

### 2.1 Stimulating Students' Interest in Learning

Mathematics can effectively improve students' ability to solve problems. Students can think through mathematical theory and methods, and get different ways of solving problems according to different ways of thinking. To some extent, this can effectively cultivate students' ability to analyze and solve problems. Not only that, mathematics can also make students realize the importance of mathematics in daily life, let students more actively explore mathematical knowledge, improve students' awareness of mathematical application, and enable students to effectively use mathematical thinking to solve problems in their future life and work. The society is demanding more and more talents. Only with high mathematical literacy, can talents have a foothold in society (Li, 2014). But many students are afraid of mathematics and think that it is difficult to learn. Some students think that mathematics is just a synonym of degree and exam, which has no practical use. This idea will not only affect the future of students, but also reduce the teaching efficiency. Therefore, if we want to change students' wrong ideas, we need to start from the source of mathematics and solve practical problems. Mathematical modeling idea can effectively change the students' concept. Students can realize that mathematics is a scientific category through learning mathematical modeling, and its importance in life and work, so that students can actively want to have the ability to solve problems.

### 2.2 Improving Students' Literacy

Mathematical modeling has a far-reaching impact on students' future work and learning, because mathematical modeling belongs to the scope of scientific research activities. Mathematical modeling also has higher requirements for students' ability. Schools can organize mathematical modeling competitions to cultivate students' ability to apply mathematics (Yang, 2015). Mathematics contest can not only cultivate students' innovative thinking ability, but also stimulate

students' potential innovative spirit. For students, mathematical modeling has the function of linking theory with practical problems. Therefore, mathematics teachers need to actively guide students to learn mathematics knowledge in the process of teaching, so that students can master the background and content of mathematics to deepen students' understanding of mathematics problems and improve students' mathematical literacy. In addition, mathematics teachers should actively cultivate students' ability and consciousness of mathematics application. Let students deepen their understanding of mathematics by participating in mathematical modeling, learning mathematical models, and so on, so as to cultivate students' awareness of mathematical application, which to a certain extent can effectively enhance students' ability to solve problems through mathematics.

## 3. Application of Mathematical Modeling in Education and Teaching

### 3.1 Solving Educational Problems through Mathematical Modeling

Mathematical modelling can transform a chaotic practical problem into an abstract mathematical problem. Through mathematical modeling, modelers can analyze and explore problems in various ways, and then solve practical problems through various ways of thinking. The quantitative relations and spatial forms of practical problems can be expressed in mathematical language, that is to say, mathematical modeling has the function of connecting practical problems with mathematical problems. Through mathematical modeling, students' mathematical literacy, application ability and innovative spirit can be examined. Mathematical modeling is a mathematical thinking method (Wang, 2017). It can use mathematical language and methods to solve practical problems through abstraction and simplification. Case teaching is one of the most effective teaching methods in education and teaching. Case teaching can quickly train students to set up mathematical thinking, enable students to master mathematical modeling methods faster, and deepen the understanding of mathematical models. Teachers can analyze and explain cases for students before or after class. Case explanations before class can bring students' thinking into a fixed mathematical environment, so that students can have a deeper understanding of what they are going to learn. After class, case explanations can enable students to further grasp the knowledge points, through case analysis, simplification, the establishment of variables and related parameters, and then establish a suitable mathematical model to solve the problem.

### 3.2 Application of Mathematical Modeling in Educational and Teaching Efficiency

At present, mathematical modeling is widely used in education and teaching, so it plays an important role in improving the efficiency of education and teaching. Taking higher mathematics education as an example, this paper discusses the role of mathematical modeling in improving the efficiency of education and teaching (Du, 2018). Usually, in the teaching of calculus theorem of higher mathematics, there are corresponding calculus and geometry meanings. By making full use of the geometric meaning corresponding to calculus, we can reveal the internal relationship of calculus. When revealing this connection, we need to use mathematical modeling to solve it, so as to ensure that the theorem can be obtained in time. For example, when proving the mean value theorem of calculus, we can prove it by establishing a high number auxiliary function model.The concrete expression is the mean value theorem $\varphi(x) = f(x) - f(a) - \frac{f(b) - f(a)}{b - a}$ ,By establishing mathematical model and transforming it into Rolle's theorem for proof, the final conclusion is obtained and the tedious proof of median theorem is reduced. It can be seen that in higher education, we can use mathematical modeling to enlighten students' thinking and improve the efficiency of education and teaching. At the same time, in the teaching of higher mathematics education, for double integral, the parity of integrable function can be effectively combined with symmetry, and a mathematical model can be constructed to reduce the difficulty of solving integral and improve the teaching efficiency.

## 4. Relevant Strategies for Improving the Efficiency of Education and Teaching

### 4.1 Strengthen the Efficiency Consciousness of Education and Teaching

At present, the efficiency of education and teaching has not been paid attention to, and schools are still using traditional teaching methods. Simple teaching means, invariable teaching content, and evaluation of students' mathematical literacy by examination results all indicate that the efficiency of education and teaching has not been paid attention to. Although teachers are very serious in teaching and students are also working hard to learn the curriculum, the teaching effect is still poor, and the rate of students' failure in academic performance is still very high. This is closely related to the traditional teaching mode and evaluation system. Therefore, teachers urgently need to update teaching concepts and means to meet the needs of social development. Teachers should not only impart knowledge to students, but also focus on how to train students to think in mathematics, so as to improve teaching efficiency. Mathematics is not only a course, but also a tool course. As long as you master this course, you can better adapt to school life. Teachers' awareness of efficiency will directly affect classroom efficiency. Therefore, teachers should set up correct teaching objectives and improve their comprehensive ability in order to improve the efficiency of classroom teaching.

### 4.2 Optimizing Course Content

At present, most of the teaching materials focus on logic and rigor of theory. Therefore, teachers only pay attention to the content of textbooks, teaching according to the content of textbooks. In teaching, they pay too much attention to the systematic theory. Only a few students can keep up with the progress of the course, while some students with poor foundation can not keep up with the progress of teaching. Therefore, the content of the teaching system must be adjusted and optimized. In the teaching materials, we should reduce the content that is not practical, simplify the complicated reasoning, emphasize the essence of knowledge, and make the concepts and principles clear in a simple and understandable way. Teachers should have a profound understanding of the content of the textbook. Only by mining the content of the textbook thoroughly can they teach more efficiently and improve the efficiency of the classroom. Mathematics teachers should make good use of textbooks to teach, rather than teaching according to textbooks. There is a certain difference between the content of textbooks and the content of teaching. Therefore, teachers should not confine themselves to the content of textbooks, but also teach according to the experience of predecessors.

### 4.3 Innovative Teaching Methods

One of the breakthroughs and breakthroughs to improve teaching efficiency is to innovate teaching methods. There are many kinds of teaching methods. Teachers should not only use a set of teaching methods throughout their teaching career, but also learn and use new teaching methods to teach in order to meet the needs of the times. Teachers should update and adjust the teaching methods according to the characteristics of students' development. They should focus on explaining the difficult contents, while teachers can organize discussions to teach some problems that need to be considered. In the face of simple teaching content, teachers can guide students to study independently and guide students to explore knowledge independently. In order to cultivate students' abilities, mathematical model analysis and mathematical experiments can be added in teaching. At the same time, teachers should arrange exercises for students according to the teaching progress and content, and assign assignments in various forms, so that students can learn and consolidate in an all-round way. Teachers should correctly understand the meaning of improving teaching efficiency. Improving teaching efficiency refers to letting students turn what they have learned into their own knowledge, not to letting students master the content of teaching materials in limited classroom time.

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