

THE CULTIVATION OF MATHEMATICS MODELING THOUGHTS IN HIGH SCHOOL STUDENTS

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ABSTRACT

Mathematical modeling is a bridge between mathematical knowledge and mathematical application. Research and learning mathematical modeling can provide students with help to explore the application of mathematics, so that students can develop interest in mathematics learning, and cultivate students' innovation and practical ability. In high school, the mastery of mathematics will have a crucial impact on the college entrance examination. Therefore, in the ten years since the reform of high school mathematics curriculum, people have been strengthening the cultivation and research of mathematics modeling from the theory and practice of the curriculum.

Keywords: Mathematical Modeling Training High school students.

PREFACE: As my high school mathematics curriculum reform, and mathematical modeling as a core quality is present, it means that the current high school classroom will be the existence of mathematical modeling. However, in the current educational situation, most of the students in mathematical modeling of understanding is not thorough enough, therefore, at the core of the viewing angle of the strengthening of the mathematical modeling study is extremely important. Application for student awareness and cultivate practical ability, high school math teaching the weak links in the current forms of education, to provide students with self-learning, self-reliant and problem-solving ability, high school math teaching reform. Therefore, the effective number of mathematical modeling activities to develop students' mathematical modeling to better enhance and develop students' learning achievement and learning^[1].

The current phase of my high school education is still in its traditional form should be education, most of the students for math learning remains on traditional teaching methods, such as: cooked in the formula, and that method, the actual problems in the response phase. However, the integrity of the system, the system's teaching knowledge systems into the weakness of capacity. The basis for such students want to quickly integrate into the teaching of mathematical modeling. There are certain difficulties, because the mathematical modeling ideas for math and ideological transformation, their knowledge of the stringent requirements, you need to have good ideas into power and the wealth of knowledge. Thus, in the case of a high school teacher, at the moment the foremost task is to help the students take Mathematics, on the basis of solid, solid foundation and a complete mathematical knowledge network.

CHAPTER1.THE DIVISION OF MATHEMATICAL MODELING LITERACY

This paper main reference is "Ordinary High school Mathematics Curriculum

Standard (2017) Edition" carries on the division to mathematics modelling studies quality level, carries on the description through four aspects: Scene and question, knowledge and skill, thought and expression, exchange and reconsidering. Corresponds the compulsory course to finish separately, when selective compulsory course conclusion, to the student mathematics modelling accomplishment the request which achieves proposed, is the studies quality primary coverage. Divides into three levels mathematics modelling accomplishment:

Level	Accomplishment
Level1	<p>Mathematics modelling</p> <p>Understands the familiar mathematics modelling the actual background and mathematics description, in the understanding mathematical model parameter, the conclusion actual meaning. Knew mathematics modelling the process includes: Asks the question, the establishment model, the solution model, the examination result, the perfect model. Can in the familiar actual situation, the imitation has studied mathematics modelling process solve the problem.</p> <p>Regarding has studied mathematical model, can explain with examples the modelling significance, realizes its implication mathematics thought; The feeling becomes aware mathematics expression to mathematics modelling importance.</p> <p>In the exchange process, can draw support from or the quotation had mathematics modelling result explanation question.</p>
Level2	<p>In a familiar context, issues and translated into a mathematical problem, know the value of the mathematical problem and the role.</p> <p>To be able to choose the appropriate expression of mathematical models to solve math problems; understand the significance of the model parameters, and how to determine the parameters of the model, and the model; on the basis of the practical significance of the test results and improve the model to solve the problem.</p> <p>In the context can be associated, through mathematical modeling process, understanding the meaning of mathematical modeling; the ability to use mathematical language to express mathematical modeling and problem solving process and results. A study that shows the results of the study.</p> <p>In exchange, you can use the model's ideology and solve the problem.</p>

Level3	<p>In the integrated scenario, the use of mathematical thinking for analysis and discovery scenario, the mathematical relationship between the mathematical problem.</p> <p>To be able to use mathematical modeling of the general approach and related knowledge, creativity and the establishment of a mathematical model to solve the problem.</p> <p>To be able to understand the mathematical modeling of the significance and role; the ability to use mathematical language, clear and accurate expression of mathematical modeling of the processes and results.</p> <p>In exchange, through mathematical modeling of the conclusions and ideas on science and social phenomenon.</p>
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Mathematical modeling of the level 1 of demand is high school students graduated from high school should meet the criteria, as well as for high school math academic standard to test the propositions; Level 2 requires that the College Scholastic Ability Test based on the proposition; Level 3 is based on the selective mandatory, compulsory and elective courses, some of the content of the mathematical modeling of the reach of the request, it can also be used as an autonomous university admissions reference [2].

CHAPTER2. MATHEMATICAL MODELING THE VALUE OF THE MATHEMATICS DISCIPLINES

Mathematical modeling of mathematics and the link between the outside world provides a bridge, it is important to resolve practical problems by means of a high school students to try new methods of mathematical thinking, and also contribute to the development of mathematics.

RAISES STUDENT'S MATHEMATICS ABILITY

Mathematics modelling designs the question is generally the actual problem, in solves in the question process to need to establish the mathematical model, regarding the high school said since birth expresses with the mathematical linguistics them and forms the abstract mathematics question is quite difficult, this requests the student in mathematics modelling process the process to discover and to propose the question, the establishment and the solution model, the examination and the consummation model, finally can analyze and solve the question. Through solves the question process to raise student's analysis synthesizing capacity, abstract summary ability as well as confirms the mathematical model through the experiment ability. From various, multiple perspectives regarding question, may more comprehensive carry on the question analysis.

STIMULATES THE STUDENT TO STUDY MATHEMATICA THE INTEREST

In mathematics modelling activity, lets the student understand mathematics modelling, the understanding mathematical model forming process is quite important. In the modelling entire process, how can let the student experience truly uses mathematics "the eye" to observe the actual problem, proposed and "the language" describes and the analysis question using mathematics, finally can the mathematization form quite clear carries on the supposition, analyzes and solves. May let the student feeling through such teaching process become aware mathematics is realistic, useful, thus the

understanding mathematics value, strengthens the student to study mathematics the interest^[3].

RAISES THE STUDENT KNOWLEDGE SYNTHESIS UTILIZATION ABILITY

Not only in mathematics modelling process, the student must have the solid mathematics knowledge, can extrapolate, but also can contact the reality, the interdisciplinary expanded aspect of knowledge. Mathematics modelling for raised student's various ability to provide the place and the way. Through the accumulation certain solution actual problem experience, the final student can promote the sustainable development accomplishment which the adaptation modern society requests.

CHAPTER3 TRAINING STRATEGIES OF MATHEMATICAL MODELING THOUGHTS

ESTABLISHMENT APPROPRIATE QUESTION SITUATION, PROMOTES STUDENT'S MATHEMATIZATION ABILITY

In mathematics classroom instruction, the teacher can use the establishment question situation frequently the teaching method. It can cause the teaching to enter the subject directly between, pulls closer mathematics question and the student lives the distance, simultaneously solves in the life problem for the student to serve. It may arouse student's study enthusiasm, transfers student's experience of life, stimulates student's study motive and the curiosity, raises student's seeking knowledge desire, causes them to study even more is interested. Provides the enough ponder question for the student the space and the time. The establishment high quality teaching question situation, can guide the student to study the teaching on own initiative, sharpens student's power of thought.

For example: In order to greet 2 · 13 link dates the arrival, some link company promotes three kind of handset cards for the user choice, the charge standard is as follows: Economical card monthly rent 30 Yuan, 2 jiao/min; Dear ones card monthly rent 12 Yuan, 4 jiao/min; Passes pleasant without the monthly rent, 6 jiao/min.

Question 1: When does each month converses on the telephone 150min, which kind of card use to be worthwhile?

Question 2: In any situation, the use dear ones card calculates; In any situation, the use passes the calculation pleasant; In what situation, does the use economical card calculate?

Question 3: When does each month pays expenses 300 Yuan, which one kind of card use to be able to let oneself make how many minutes phone call?

Question 4: If hits 20min every day the telephone conversation, a month calculates according to 30 days, then which one kind of card does use to take into account relatively?

Question 5: In what situation, are three kind of card charges same?

Question 6: A person has not carried on the telephone conversation in some month, then which one kind of card he should select?

Question 7: When person each month of telephone conversation time surpasses 200min, which kind of card uses to take into account?

Question 8: Each month speech spends 150 Yuan, which kind of card uses to take into account?

Through a such life actual problem analysis, guides the student using the function, the equation or the inequality related knowledge relation establishes three kind of expense cards the mathematical model. Economical card: $y=0.2x+30$; Dear ones card: $y=0.4x+12$; Passes pleasant: $y=0.6x$. Then guides the student to draw the function image using the functional equation, the student may use the image intuitive, which one kind of expense

card the observation image analysis chooses to take into account, and will obtain the result and the actual problem will carry on the comparison examination.

Is familiar with “the handset speech expense” by the student the establishment situation, stimulated the study interest, the student again through the discussion after, revolves “to take into account” and “does not take into account” carries on the question which the question proposed the solution, promoted the student on own initiative the sense of participation, in entire solved in the question process, the student launched such mathematics thinking activity: Found the problem - proposed the question - solves the problem. Thus it can be seen, under teacher's guidance, the student definitely may according to the establishment situation propose has the significance mathematics question, and through solves mathematics problem which oneself proposed to obtain the correlation mathematics knowledge and the thought, the method and the skill. At the same time, inspires the student to discover, to ask and solves the actual problem, fundamentally arouses student's study enthusiasm, unfolds the independent cooperation study naturally, realizes student's in teaching main body status, thus completes own in mathematics activity mathematics “to create again” with the initiative mathematics construction, achieves the gain mathematics knowledge, the experience mathematics thought, the grasping mathematics method goal.

SEEPAGE MODELING MATHEMATICS THOUGHTS, PROMOTES STUDENT'S PRACTICE APPLICATION ABILITY

Permeates mathematics modelling thinking method in the high school mathematics teaching process the general process, is one of high school mathematics modelling teaching implementation best ways. Seeps mathematics modelling thought in mathematics teaching process is refers in mathematics teaching the prominent mathematics modelling general step, in mathematics modelling each step meaning, the function, the modelling must pay attention the basic question as well as each step synergism carries on the key elaboration. On the one hand lets the student understand between mathematics each step the mutual relation, on the other hand causes the student whole grasping utilization mathematics modelling solution actual problem the unit process. In mathematics modelling method stratification plane, the teacher should from propose the question, the analysis question, the construction model, the solution model, the model conclusion and the promotion and so on several important steps carry on the explanation to analyze^[4].

For example: Teacher when teaching trigonometrical function, if continues to use traditional the teaching method, is the teacher first to the sine function, the cosine function correlation definition carries on the explanation, through the specific example, inquired into its can different change the rule because of the condition, after has analyzed knowledge, the recombination mathematical computation topic carries on along with the hall practice enhancement is consolidated, guarantees the student regarding a knowledge grasping. But, the teacher in the middle of this teaching, was merely places the key point the formula to apply mechanically in the problem solving application, has actually neglected between the trigonometrical function inner link as well as the rule. Therefore, under such background, the high school mathematics teacher must strengthen to student's guidance, lets the student the round position relates in the trigonometrical function and mathematics coordinates carries on the understanding, extends to the special angle function value by the common angle function, through function image position migration introduction periodic function knowledge spot, thus infers the trigonometrical function the formula. Conforms to simplicity through such one to the numerous thorough process, lets

in the student mind construct the integrity again the knowledge network. Thus, is more effective regarding a knowledge grasping.

For example: the sea by the gravity of the sun and the moon, in a certain period of fluctuation phenomenon is called "tide", generally, the early tide called tide, late tide called tide. Under normal circumstances, the ship enters the fairway at high tide and is close to the dock; After unloading, return to the ocean at low tide. The following is the relationship between the time of day and the water depth of a certain port in a certain season:

Time	depth (m)	Time	depth (m)	Time	depth (m)
0:00	5.0	9:00	2.5	18:00	5.0
3:00	7.5	12:00	5.0	21:00	2.5
6:00	5.0	15:00	7.5	24:00	5.0

- (1) a function is selected to approximate the functional relationship between water depth and time of this port, and the approximate value of water depth at the integral point is given. (accurate to 0.1)
- (2) the depth of draft of a cargo ship (the distance between the bottom of the ship and the surface of the water) is 4 meters, and the safety regulations require at least 1.5 meters of safety clearance (the distance between the bottom of the ship and the ocean floor). When can the ship enter the port? How long can I stay at the port?

Trigonometric functions by using a triangle function image analytic expression, constructing trigonometric function model to solve the problem, in the process of answer questions experience using studied from the perspective of mathematical thought, mathematical thinking and mathematical method to observe life, analysis of natural phenomena, the strategy of solving practical problems, make students realize the math is all around us, it is also the understanding and the powerful weapon to solve the problem of our life, but also won the math to explore the experience and ability, enhance the understanding of mathematics and applied mathematics to the belief in life.

THE APPLICATION OF MATHEMATICAL MODELING IDEAS IS STRENGTHENED BY PRACTICAL CASES

In the classroom teaching, if you can put each knowledge point of mathematics through the three-dimensional way, very vivid display in the students' mind, abstract into concrete. As a result, when students solve mathematical problems, they will automatically match and screen the questions and lay the foundation for mathematical models. At the same time, it can also form a complete knowledge network system and provide a good support for the modeling thought, which also plays an important role in strengthening the students' modeling thought.

In order to cultivate students' mathematical modeling literacy, teachers can use specific practical cases to integrate mathematical modeling ideas and strengthen the application of mathematical modeling ideas in the process of mathematics teaching in high school. In mathematics for high schools are three "random events and probability" is a required course as an example, the teachers in guiding students to learn the lessons, can use problem to carry out teaching, combined with events in life such as teachers is introduced into the content of the lesson: "now we casually took out a coin, throw it up, then the whereabouts of your coin is heads or tails up? What are the probabilities of each of these?" To life instances in mathematics teaching, at the same time, the teacher when teaching to a random

event, to focus on application of mathematical modeling thought, introduces the theory of random events of knowledge into more abstract mathematical framework, students can grasp more clearly in the process of learning what is a random event, the relationship between frequency and probability, and the basic properties of probability, the teaching material of middle school to knowledge applied to practical problems, solve the problem of more random event, in order to improve students' mathematics learning level and practical application of the mathematics knowledge to ability. Using actual cases in teaching, not only can strengthen students' ability of mathematical theory knowledge to use, in the process of case teaching of mathematics teachers in combination with mathematical modeling thought, and strengthen the application of mathematical modeling thought, in imperceptible middle school students to the improved quality of mathematical modeling, able to more fluent in solving mathematical problems, in order to ascend to the period of high school mathematics teaching quality and efficiency, promote the all-round development of students' comprehensive quality [5].

CONCLUSION

Mathematical modeling is a kind of efficient teaching thought and teaching means, in the higher mathematics teaching work, the integration of mathematical modeling thought, not only can effectively enhance students' confidence in learning, but also can enhance students' comprehensive ability, promote the overall development of students. When carrying out the teaching infiltration of mathematical modeling thought, teachers can flexibly apply a variety of teaching methods in combination with teaching objectives and students' actual learning conditions. Actively integrate the methods of autonomous inquiry learning and task teaching into the teaching work, promote the development of students' logical thinking ability, enhance their autonomous learning ability and lay a good foundation for students' lifelong learning while continuously enhancing their learning enthusiasm.

For students, their study in high school is related to their future career direction, among which the cultivation of mathematics quality plays a crucial role. Our today's education system is the implementation of quality education, to cultivate all-round development of talent, the mathematical modeling teaching to cultivate students' comprehensive quality and innovation education, improve the students' innovation ability and practice ability, promote and deepen the reform of college teaching, from the theory and teaching practice in recent years have proved to be very clear, have broad consensus inside and outside of the teaching profession.

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