Application of Mathematics Teaching Cut Samples

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Abstract. This paper, rebuilds example's definition, value and principles to follow, expounds its function by example separately, hoping to present more clearly example method.

Introduction

Mathematics, usually connecting with boring and difficulty together, also is a discipline requiring most effort and but yielding less results. It involves characteristics of subject such as highly abstract mathematics content, accurate conclusion, rigorous reasoning, extensive application, etc. Mathematics's new curriculum reform requires "give the classroom back to students, make mathematics classroom vivid", which is also major responsibilities to mathematics teachers assigned by era. Interest in mathematics has great significance on teaching math knowledge, promoting mathematics ability, reducing burden and increase efficiency, so to speak, students' interest strength in mathematics determines the quality of learning mathematics. Therefore, mathematics teachers should actively explore various mathematical teaching methods, fully motivate and mobilize students' learning motivation, increase students' learning motivation, and cultivate students' interest in learning; follow the psychological law of students' learning mathematics, emphasize starting from the life experience of students, let students personally experience process of converting the actual problem into abstract mathematical model for interpretation and application, thus make the student obtain the understanding of mathematics at the same time, get progress and development in such aspects as thinking ability, emotion attitude and values, etc.

The most commonly used method to interpret a principle is perhaps an example. Example can make whatever you want to say more comfortably intelligible and enlightening. Recently I'm shocked by the layout of this book "monographic study on elementary mathematics" of Professor Li Xingyun in reading, thanks for Professor Li's too much efforts to write! In this book, behind each theory or concept, inevitably followed by classical and aligned examples to illustrate, make readers easily understand the theory in the book, which is rare in the similar materials, after all, easily readable book will be welcomed by the masses, particularly precious as mathematics!

In the face of a group of math non-proficient students meeting more obstacles in learning, to teach them will naturally choose the methods easy to accept, I have been teaching for many years, and I feel example is an efficient teaching method. It can be used in the whole process of teaching, combined with other teaching method to use, so to speak, example teaching is an important part of mathematics teaching, plays a decisive role in the mathematics teaching.

Example's Definition, Value and Principle to Follow

Definition and Value. The so-called example, namely, in teaching, through the analysis of some specific example, confirm or extract necessary knowledge, help students to deepen understanding learned knowledge and concept. In classroom instruction, example is a common method linking practice to explain the problem, also an efficient means, even more a subtle arts. For teachers, example is an efficient teaching method, a class teaching arts; for students, example is an effective learning strategy, which can turn invisible into tangible, abstract to concrete.

Professor Zheng Yuxin once puts forward that mathematics teacher should have three basic skills: be good at citing, questioning and comparing. To cite proper examples can make mathematic

knowledge simple and easy to accept; the classroom full of examples can more concentrate students' attention; typical examples can play a good mode role in mathematics method and skills, speed up the mastering process; some enlightening examples can stimulate students to think, cultivate good personality quality or dialectical materialism view; all in all, reasonable example in mathematic classroom can play a good role in improving teaching effect and cultivating learning interest! In teaching, using examples can play a great improvement role for teachers and students. For students, example is conducive to understand concept essence, remember knowledge and cultivate learning interest. For teachers， using samples in teaching， can break through key point, resolve difficult points, improve learning efficiency.

Principle of Example. Vivid, timely appropriate examples, close to the real life is one of efficient mathematics teaching methods, can vigorously motivate students' learning initiative, improve students' learning interest, enlighten students' thoughts, increase interaction between teachers and students. As teachers, should follow below principles in citing examples, and continuously improve and perfect, then achieve its expected target.

(1) Corresponding nature

Examples should be proper, corresponding with the knowledge to instruct, featured by Typicality and persuasiveness. Example should popularize specific theory, materialize abstract concepts, facilitating students accurately know the point from the samples to realize the internalization of knowledge. Focus on the inner relations of teaching content, try to make sure the samples can accurately reflect the inner rule of problems. The cited samples should explain clearly if differs from the contents to instruct. If the sample is wrong, it will mislead students' thinking, causing bad results. Both positive and negative samples can be used, to form complementary thinking. In addition, teachers cite samples based on actual knowledge level, understanding ability, life experience, accurately grasp the point, aiming at the key point and difficult point in teaching to instruct, try to shoot at the target. For abstract concept and profound theory, students are easy to generate negative knowledge transfer, or tendentious problems, to cite necessary and proper samples can enlighten students' thinking, conducive to know new knowledge and resolve problems. In teaching, we should grasp the chance to cite samples, some of which can be put before the class, to export problems, causing students' suspense, motivate desires for exploring. Some sample can be cited after class, to explain the above-mentioned theory and concept. Some are suitable to explain in class, playing a contextual role. But attention please, failing to grasp the key topic, lack of clipping example, irrelevantly cited references, will weaken the theme, disturb students' normal logical thinking.

(2) Reality

Emphasizing the connection between mathematics education and life world is an important characteristic of mathematics course reform. It is pointed out that in "mathematics curriculum standards", mathematics class content should fully consider human activity trace in mathematics development, be close to students' familiar real life, unceasingly communicate the link between mathematics in life and mathematics in textbook, integrates life and mathematics. Mathematics comes from life and serve for life, everywhere is mathematics in life. Samples in teaching should be close to students, students' thinking and life reality, which can resonate with students. Since the textbook is compiled by national students, the samples in the book are not the most suitable to students themselves, so this requires teachers to more communicate with students, to understand what the students think. Only teaching in this way, can arouse students' concern, deepen understanding teaching contents, and better link theory and real life. In teaching, teachers should often let students use what they learned to resolve the actual problems in life, make them timely grasp the leaned knowledge in teaching practice, feel the mathematics learning value, then increase the confidence to learn mathematics well, learn to see and think the objects around them from mathematic angle, to broaden the learning scope. For example, there are some samples as blow for understanding the difference between permutation and combination: (1) Every two student shake hands once in the 50-student class, how many time of shaking in total? (2) To exchange pictures each other in 50-student class, how many pictures are necessary totally? Samples close to

life, are bound to arouse students' attention and deeply comprehend the knowledge, feel the happiness in learning, and have the strong interest in learning mathematics.

(3) Simplicity

Samples should be concise and comprehensive, to achieve the predicted effect. If the sample is too cumbersome, it will disperse students' attention or fail to make students grasp the point, dominated, playing a contrary role. In addition, mathematics emphasizes simplicity, if one sentence can explain well, please don't add one more word. Everything should base on the teaching purpose, control the citing samples process, don't ramble on and on, leading to painting the lily or narrating complicatedly, making students feel disgusted. For example, in introducing logarithmic function, there are below samples to choose: (1) Assuming that, our country's gross national product are hundred million yuan in 2000, if it increases at the rate of 7.5% every year, then how many years later the gross national product is twice of 2000? (2) How many times' fission can a cell obtain 128 cells? Both (1) and (2) can introduce the definition, but (2)'s narration is much simple, the involving number is integer, so students can easily enter the situation and participate in thinking.

(4) Novelty

The novelty of citing samples in the classroom is a crucial factor for successful teaching, make the class content keep pace with the times, increase the attention of classroom with emerging new situations and problems. The novelty of citing samples requires teachers to make good preparation before class, pay attention to daily accumulation. Focus on the latest knowledge information from different channels, to organically combine with teaching. We should be clear that, only such teaching can have the source running water, broaden the spacious boundary in teaching, constantly attract students with fresh and interesting samples, so as to better instruct students to understand knowledge. For example, referring to exponential function, can start from below samples: the well-known "Roof of the World" Mount Qomolangma is 8848 meters high, a 0.01- cm - thick newspaper, both cannot compare, but a newspaper's uncle talks to Xiao Juan:" fold a piece of paper in half 30 times, is it higher than Mount Qomolangma" . Xiao Juan doesn't believe, what about you? This sample is incredible, so it can quickly arouse students' attention, which is a good beginning.

(5) Flexibility

Every class has its specific teaching purpose, which should be the main line through the whole process. Sample serves for teaching method, not for samples only. Teachers should reasonably distribute the instances in teaching. For teaching point, to cite more samples is permissible; for non-key content, can cite fewer samples, or no samples. After citing a sample, if students still don't understand, teachers should change a more appropriate sample, if failing to think of proper samples, be careful to avoid random citing. Giving chance to students for their own samples is a good practice, which brings good teaching effects. No need to cite samples for easily understanding knowledge, sometimes, no need rigidly citing samples if it is proper to use other methods. In addition, positive and negative samples can be used to form complementary thinking. In a word, proper samples can play their due value.

(6) Enlightenment

If it possible, teachers can cite more enlightening samples to inspire and educate students' thinking. The teaching method in teaching classroom, should persist the enlightening way, reject spoon-feeding. Citing samples in classroom, as a teaching means, should be enlightening, lead students to actively participate in teaching activity process, actively think and explore, seek for methods and path to resolve problems. Teachers should make good preparation for teaching work, carefully dig into textbooks, comb out the relation between new knowledge and past knowledge, combing students' knowledge level and acceptability, reasonably arrange the enlightening teaching process, in order to maximumly enlighten students' thinking.

Samples' Application in Teaching

Sample's applicable scope is very broad, it can explain definition, also use in introduction process, teaching solving problems method, combing out relation of similar knowledge, and enlightening

thinking. Correspondingly, there are many citing samples way, it can be one sentence, a sample or a story. But all forms are subjected to teaching purposes. Also note that: only well link and show how the knowledge to instruct and samples, can achieve predicted effects.

Explaining the Definition, Formula and Theorem. For many definition, formula and theorem in mathematics, it is great to cite several samples with students together to deepen the understanding. For example, after teaching the definition of limiting angle, let students cite several specific samples, or teachers show several angles to ask students to judge which are limiting angle. After teaching the product's logarithmic formula ($\log_a(MN) = \log_a M + \log_a N$), let students to judge truth or falseness of the below two formula $\log_a x + \log_a y = \log_a xy, \log_a x \cdot \log_a y = \log_a(x+y)$, to correct students' presumable misinterpretation for the formula. After deducing the theorem of inequality (if $a > b$, then $a + c > b + c.$), let students judge the truth or falseness, if $a > b$, then $a - c > b - c.$, to help students to correctly understand the essence of the theorem.

Application in Introduction. It can be used to introduce definition, formula and theorem. In order to get the definition of the angle of any size, teachers can play the video of a section of gymnastics competition, to introduce definition. The definition of exponential function can be introduced by the samples of cell division. In order to get Angle formula of same terminal side, can introduce through the sample that "find all angles with same terminal side as a specific angle". In order to introduce Vieta's formulas, teachers can give two specific linear duality functions, let students respectively gain the value of sum of two roots and product of two roots, as well as coefficient $\frac{b}{a}, \frac{c}{a}$, enlighten students personally to find the relationship between them.

Instruct Solving Problem Method. No need to speak more, everyone knows the pint well, most samples in mathematics textbook are used to teach solving problems method. In explaining some important knowledge or mathematics methods, there are many supporting examples. As long as students can do well the samples, their mathematics score must be qualified. In some sense, the samples have covered main knowledge point in the book. Sample is exemplary, conducive to quickly accept these knowledge and methods. When the examples are not enough, teachers can add additional examples themselves, to help students comprehensively and correctly understand it.

Clarify the Relations. In teaching the nature of elements, can though specific examples, help students to understand and remember. Such as, taking the set of whole students of teaching classroom as example, because class and students is correspondent, so while confirming the set, element is also confirmed, namely, element of the set is deterministic; each student is different, so element is mutually different; students can arbitrarily sort but the set is same, so set is unordered. Through the samples, abstract relation becomes easily understandable and acceptable. Another example, while teaching function's extremum and maximum, can cite a sample to clarify their relations. For it, different textbooks adopts very different examples, plus many textbook involves many the theory linking extremum and maximum, so it is necessary to clarify their relations to avoiding students' misinterpretation. To make clear the relation, specific function sample is hard to cite, teachers can make a special function themselves: there are many extremums, but some of them are maximum, some are not. In this way, students can well understand, extremum is not surely maximum, and vice versa.

Enlightening Thinking. In teaching parallelogram area calculation, teachers can enlighten students to use learned area formula of rectangle and square to calculate, and guide students to change the parallelogram into rectangle, this change process is the key of enlightening students' thinking, once succeed, the proposed problems will be resolved. After resolving the problems, teachers should guide students to conclude the mathematics method of "induction". This not only teaches knowledge, also learns the method, in a manner of speaking, it does more for less. In learning multiplication, teachers can cite below samples: an ant on the way of foraging, finds a dead bug, so it immediately goes back to the nest calling for 10 partners, but they still fail. All these ants go back to nest, each one finds 10 partners, still in vain, they still persist on, again go back for partners, each one calls for 20, this time they pull together, and pull back the bug to their nest

finally, can you figure out how many ants go out totally? Through the problem, students not only learn multiplication, also feel the importance of solidarity and cooperation, which has strong education value.

Citing samples has great value on mathematics teaching, but to cite proper samples is really hard, teachers should take more accumulation and thinking. If you can accumulate many new samples, no doubt, you are a wonderful mathematic teacher.

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