

PROBLEMS AND COUNTERMEASURES OF HIGH SCHOOL STUDENTS' MATHEMATICS LEARNING ANXIETY

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ABSTRACT

The negative emotions of high school students in the process of learning mathematics are one of the reasons for the psychological problems of high school students. Too low or too high mathematics anxiety is not conducive to students' good mathematics learning and mental health development. This article aims at high school students' mathematics learning anxiety, analyzes the causes of anxiety, and puts forward some educational countermeasures for high school students' mathematics learning anxiety from the perspective of teachers. In order to reduce the level of anxiety of students in mathematics learning, cultivate students' enthusiasm for learning, improve students' mentality in mathematics learning and regain their confidence.

Keywords: High school students, mathematics, learning anxiety, countermeasures.

INTRODUCTION

Mathematics learning anxiety is a fear of mathematics. It is a morbid phobia, usually caused by mathematics problems and mathematics situations facing the attitude of mathematics^[1]. Students with mathematics learning anxiety generally lack or even lose the confidence to learn mathematics well. When it comes to mathematics, they will be afraid and disgusted. They have an escape and rejection psychology, thinking that they cannot learn mathematics. The core of mathematics learning is a mathematics thinking activity, which requires the attention of the thinking subject to be concentrated, and the cerebral nervous system must respond promptly and appropriately to operations such as memory, storage, and information processing^[2]. Therefore, it is impossible for a student who has fear, irritability or unresponsiveness and indifference to mathematics activities to carry out normal mathematics thinking activities. However, as a student, it is impossible to leave mathematics, so some high school students become extremely nervous and scared when they study, and hate mathematics but have to learn mathematics, which is easy to cause a cycle of evil behavior. It is precisely because of the existence of "mathematical anxiety" that hinders the benign development of students. Therefore, in order to achieve good mathematics education for everyone, different people have different developments in mathematics. Analyzing the causes of learning anxiety problems and using scientific methods to help them alleviate the degree or level of mathematics learning anxiety is currently a top priority.

HIGH SCHOOL STUDENTS' MATHEMATICS LEARNING ANXIETY

The performance of mathematics learning anxiety can be decomposed into numerical anxiety, abstract anxiety and other anxieties related to mathematical content and observational anxiety, practice anxiety, problem-solving anxiety and test anxiety related to the mathematical process^[3].

(a) The performance of numerical anxiety is the occurrence of tension, fear, retreat and other emotions in the context of the number and their relationship. For example, when student

encounter problems involving calculations in class or homework exercises, or anxiety occurs when calculating the total price in daily shopping.

(b) Abstract anxiety is a kind of fear that arises in the context of abstract problems such as complex geometric proofs, symbols, calculation formulas, theorem proofs, formula derivation, etc.

(c) Observation anxiety occurs when, for example, students in the classroom look at other classmates to solve problems, answer or listen to lessons, or even wait for a math teacher to come to a math class.

(d) Practicing anxiety generally occurs in situations where students practice math problems and operations by themselves, and they feel nasty and irritable about the practice.

(e) Problem-solving anxiety is anxiety such as frustration, irritability, etc. that occur during the process of students' reasoning or proving problems.

(f) Test anxiety is manifested in the context of the test. Whether it is a large exam or a simple quiz, once you enter the exam environment, there will be abnormal performance. For example, when a student takes the exam, the mood fluctuates abnormally even a few minutes before or at the beginning of the exam. Even external physical symptoms such as rapid heartbeat, sweating in the palms and foreheads, shortness of breath, dry mouth, and frequent urination are called "exam halo field". It may also be expressed in anxiety, worry, etc. After the test is over, or while waiting for the test results.

THE CAUSES OF MATHEMATICS LEARNING ANXIETY

(a) The causes from characteristics of high school mathematics knowledge

There are many reasons for students' anxiety in mathematics learning, including the high abstraction of high school mathematics knowledge, the high density of high school mathematics knowledge, and the high independence of high school mathematics knowledge.

1) The high school mathematics knowledge is too abstract. For example, although junior high school mathematics has already learned the functions of the first order, second order and inverse proportional function. However, the emergence of new terms such as collection, one-to-one correspondence, and mapping in the high school mathematics compulsory 1 textbook makes it difficult for students who have just adapted to junior high school functions to accept it immediately because they are too abstract. Another example is that spatial solid geometry is also very abstract. The focus is on students' observation ability and abstract thinking. Students with poor spatial imagination ability will feel very difficult.

2) High school mathematics knowledge is too dense. For the current knowledge of high school mathematics, take the 2019 college entrance examination outline (mathematics of liberal arts) as an example. The content of the test involves collections, function concepts and basic elementary functionsI, preliminary solid geometry, plane analytic geometry preliminary, algorithm preliminary, statistics, probability, basic elementary functionII, plane vector, triangle identity transformation, solving triangle sequence, inequality, common logic terms, conic curve and equation, derivative and its application, statistical cases, reasoning and proofs, expansion of coefficients and introduction of complex numbers, block diagrams, coordinate systems and parametric equations, inequalities are all selected. But students only have four semesters to learn this knowledge. Because in the actual teaching process, most schools will complete all the new class professors in the second semester of the second year of high school, and then they will be transferred to the round of college entrance examination review. One can imagine how dense the content is and how complex the knowledge is.

3) High school mathematics knowledge is highly independent, complicated and has many points. It is difficult to have such a strong correlation in junior high school mathematics. For example, in the A version of the textbook of the High School Mathematics People's Education

Press, Whether it is the "set" and "primary function" in the compulsory 1 textbook, or the "trigonometric function" and "vector" in the compulsory 4 textbooks. Even the knowledge in the same textbook is not sufficiently relevant. During the learning process, students are always faced with frequent and endless switching of knowledge points, and the changes in thinking patterns and problem-solving methods brought about by this.

(b) The causes from math score pressure

Entering high school, the pressure of the college entrance examination has been consistent. Mathematics scores are very important for high school students, because mathematics is not only a subject required for college entrance examinations but also a course that many students think is the most difficult to learn. No matter whether students choose liberal arts or science, math scores should not be too bad. Otherwise, the student's score will be far behind, not only will it lower the overall score, it may even be due to the unsatisfactory math scores of the college entrance examination, which may affect the student's entrance to the ideal university. It is conceivable that the pressure on high school students to learn mathematics, mathematics anxiety is not surprising in some students.

(c) Factors from parents

Every parent hopes that their child is very good and sets high goals for their children. Some parents also require their children to study very strictly. This also invisibly increases the psychological pressure on their children. They are afraid that parents will be disappointed and parents are more anxious. The child is also affected by the bad emotions of the parents, causing a cycle of evil behavior. For example, when the performance declines, blame the child for not working hard and use academic performance as a rule to evaluate the child and his ruler. The child also dislikes the parents to compare other children with themselves. As high school students, they already have the autonomy to act and have a strong self-awareness. In school, they often want to have the opportunity to learn independently. When learning mathematics encounters difficulties, parents want to get emotional support, but they are neglected. This has caused students to loathe and evade learning, resulting in anxiety.

(d) Causes from teachers

Teachers' words and deeds will deeply affect students. In the teaching evaluation, teachers pay too much attention to grades and grades. In the process of daily communication with students, it will affect the emotions of students, and make students think that teachers only care about the grades of grades, and good students are more concerned and loved. Especially for students with learning difficulties, excessive competition will overwhelm their enthusiasm and initiative. There are also some students who show disgust towards teachers, which affects students' learning of courses taught by teachers. Some mathematics teachers lack their own knowledge structure, they cannot follow the mathematics teaching principles in the actual teaching process, the classroom teaching implements "full classroom filling", and the teaching design cannot solve the three major contradictions in mathematics teaching. Students who do not learn math well will become more and more anxious.

(e) Factors from students

There are many reasons for students' anxiety in mathematics learning, including students' motivation, personality and self-efficacy.

1) Students' learning motivation is one of the important reasons for mathematics learning anxiety. Learning motivation has always been an important field of educational psychology research, one of the important factors that affect students' learning, and it is also one of the important factors of school education^[4]. Good learning motivation can enable students to achieve excellent mathematics learning tasks, pursue good mathematics scores, and gain satisfaction in mathematics learning activities. For example, some students want to achieve excellent results in the exam, and some students want to challenge difficult math problems to prove their ability or take the entrance to a famous school as the pursuit goal. The higher the

goal set, the more difficulties they encounter. Even if you try hard to move towards your goal, the destination is far away. The greater the pressure on these students, the easier to produce or increase the level of student anxiety. Conversely, students with weak learning motivation will also have anxiety. When such students encounter difficulties in the process of learning mathematics, they will have the idea of abandoning their studies, and they hate and evade mathematics.

2) If students have positive personality traits, such as self-confidence, diligence, reason, bravery, and cheerfulness, they will be good at self-control and maintain a stable attitude. Conversely, if the personality traits are negative, such as pride, inferiority, indecision, pessimism, it is easy to retreat without a fight and think of the problem in a bad direction, often with a lot of worries.

3) Self-efficacy is a core concept in the social cognitive theory created by the American social psychologist Albert Bandura and is also a key variable of self-regulation. It refers to the process of people's organization and implementation of the behavioral process to achieve the set operational goals. Many students are often skeptical or even negative about their mathematical ability, subjectively believe that they are not materials for learning mathematics, and expect that they will not complete the learning task and fail the math exam. A large amount of formal and abstract mathematics sign language in mathematics also prevents students from seeing hope of success. Mathematics has a low sense of self-efficacy, which leads to higher mathematics anxiety.

STRATEGIES FOR SOVLING MATHEMATICS LEARNING ANXIETY

(a) Dilute the fierce competition among students

In the math class, when the teacher asks a question, there will always be individual students who can immediately follow the teacher's ideas and give a perfect answer. In the class, when students are fighting for the first to say the correct result, there are always some students who will face setbacks. They may also know the correct problem-solving process, but the speed of expression is a bit slower. Over time, the accumulated sense of frustration and inferiority will turn into anxiety in this part of the students. The result of this competition among students in the classroom makes teachers and students focus on the answers given must be fast and accurate, which will inevitably encourage students to apply fixed formulas and problem-solving modes as much as possible. The standard answer, the fun of learning, is wiped out in the fierce competition in the classroom. If the teacher can group the students and let the students answer the questions after the group study and discussion, they can avoid the students from paying too much attention to the competition. In the group learning process, students will actively discuss and explore problem-solving methods together, and everyone has the opportunity to develop their own intelligence. They will focus more on the "process" rather than "result". Let students of all levels collaborate and collaborate, and at the same time carefully design the questions to make the questions have certain difficulty and exploratory nature. The students discuss together in the group and pay more attention to the problem-solving process rather than the final result. In this way, they will focus their interest on adventure and innovation without paying too much attention to "whether I am the first person to answer the question", can interact well with the teacher, and naturally, reduce the anxiety of mathematics learning.

(b) Eliminate students' mystery and fear of mathematics

Mathematics has the inherent nature of strategy, formalization, and symbolization, which will make students feel mysterious and fearful about mathematics itself. In order to eliminate such adverse effects, teachers should transmit mathematics knowledge to students in life, and everyone can use mathematics to solve practical problems around them. Mathematics is very

lively and interesting. When students apply mathematics knowledge to life and can use mathematics knowledge to solve mathematics problems in life, students will find it useful to learn mathematics, bring students closer to mathematics, create a relaxed atmosphere and eliminate students' fear of mathematics. For example, when teaching the judgment that the two planes are parallel to the plane, it can be introduced from the problems in real life. The teacher can take a bubble level and cross it twice on the table. If the bubble of the level is centered, it can be What is the point of judging that this table is parallel to the horizontal plane? (You can also show a video demonstrating the similar operation of the carpenter in the work process) In order to introduce the decision theorem that the plane is parallel to the plane. Teachers can also carry out some mathematical activities, such as self-made mathematical journals, holding contests, and special inquiry. This can show the charm of mathematics and allow students to expand independently outside the classroom. Mathematics is everywhere. Teachers should be good at discovering and designing classroom activities, increase students' interest in learning and change students' classroom learning methods, stimulate students' motivation and interest in learning, and create a good classroom atmosphere to ease students' anxiety.

(c) Clever use of analogy to make math class more efficient

High school mathematics learning has the characteristics of difficult knowledge and complicated problem-solving process. Most students cannot obtain problem-solving ability through the accumulation of knowledge. They all rely on the teacher's explanation and installation of the problem-solving method^[5]. It is easy to cause Student anxiety. However, most mathematical knowledge has continuity. Using the analogy method, based on the students' existing knowledge, based on familiar knowledge, boldly and imaginatively speculate, explore unknown areas, and complete the construction of new knowledge.

For example, if we want to prove this important inequalities:

" If $a_1, a_2, a_3 \cdots a_n$ are all greater than zero, and so $a_1^n + a_2^n + \cdots + a_n^n \geq na_1 a_2 a_3 \cdots a_n$." Teachers can guide students to discuss " If $a > 0, b > 0, c > 0$, and so $a^2 + b^2 \geq 2ab$." or " If $a > 0, b > 0, c > 0$, and so $a^3 + b^3 + c^3 \geq 3abc$." After proving these two inequalities, teachers should guide the students to make an analogy and think of the inequality that requires proof. On the basis of the previous verification ideas, the students continued to expand the inquiry and gradually found the research direction of important inequalities. The use of analogy in teaching can help students successfully acquire new knowledge based on old knowledge.

(d) Guide students to decompose the problem and reduce the difficulty of the problem

In the process of solving math problems, question review is the key. Many students often do not know where to start when they see some questions, which will cause fear. Especially when faced with complicated problems with given known conditions, he was afraid of the battle without losing the confidence to learn math well. Teachers should try to guide students to decompose complex problems and break them into simple questions to reduce the difficulty of the problem, to find a breakthrough to solve the problem, and then merge the conclusions they draw. In fact, this process is not as complicated as the students imagined. It finds a breakthrough from relatively simple problems and comprehensively applies the accumulated knowledge. This can gradually cultivate students' ability to analyze and solve problems. The difficulty of the subject is reduced, students can successfully solve complex problems, and anxiety is naturally reduced.

(e) Give students more opportunities to express and experience the fun of success

Students who want to have a successful experience in this course of mathematics must start by overcoming mathematics anxiety. In addition, successful experience in mathematics will help students overcome mathematics learning anxiety. In fact, asking and discovering

problems is much more difficult than solving them. Create problem situations, let students participate in discussions, find problems and raise problems, and enhance students' self-confidence and curiosity. In the teaching process, teachers must pay attention to the presentation of various mathematical materials, proper consideration in time and space, and proper consideration of the depth of knowledge, which will inspire students to think. Students naturally ask questions, ask conjectures, make assumptions, and be bold. Innovate and get a successful experience.

CONCLUSION

Through the investigation and understanding of the mathematics learning situation of high school students, it is not difficult to find that whether students are disgusted with the mathematics course or the mathematics teacher, one of the main roots is that students have mathematics learning anxiety. In high school mathematics learning, the students' ability and knowledge reserve are higher. With the growth and development of high school students, the development of different students' thinking also has their own speed. Their basic knowledge reserves and the flexibility of using mathematical knowledge to solve problems are different. Once students have anxiety in mathematics learning, the problem becomes more complicated. Solving the anxiety problem of high school students' mathematics learning is bound to be a long-term and complicated process. It is not only necessary to administer the right medicine, but also to have persistent patient guidance to help students get out of the predicament of anxiety. Guide and inspire students to take risks, experiment, and try new methods, so that students can acquire the ability to understand mathematics. Promote the common development of teachers and students in teaching and learning, increase students' self-confidence and interest in mathematics learning, improve students' anxiety level in mathematics learning, improve mathematics learning achievements, and actively promote students' good physical and mental development.

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