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Research on the Transformation Strategy of the Students with Mathematics Learning Difficulties in the First Year of Senior High School in China Based on the Theory of Multiple Intelligences

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***Abstract* – The problem of students with learning difficulties is a key issue of school education in China today. As a part of the problem of students with learning difficulties, the problem of students with learning difficulties is also receiving increasing attention from educators. And the quality of the first grade mathematics learning in high school greatly affects the effect of the whole high school mathematics learning. Therefore, from the perspective of multiple intelligences, this paper makes a comprehensive analysis of the causes of students with mathematics learning difficulties in the first year of high school, and puts forward the corresponding transformation strategies for students with mathematics learning difficulties in the first year of high school.**

***Keywords* – The Theory of Multiple Intelligences, Students with Learning Difficulties, Transformation.**

I. INTRODUCTION

At present, a new round of scientific and technological revolution and industrial transformation are accelerating in the world, and new technologies such as artificial intelligence and big data are in the ascendant. Therefore, to improve China's international competitiveness, promote industrial transformation and upgrading, and achieve high-quality economic development, a large number of high-quality talents of all kinds are urgently needed. This requires our educational concepts and models to adapt to the development of the times, deepen educational reform and comprehensively promote quality education. To carry out quality education, we must face all students, develop the potential of each student to the maximum extent, and improve the quality of each student. Therefore, how to improve students' academic performance and reduce the number of students with learning difficulties has become an urgent task.

The problem of students with learning difficulties is a problem in every country. With the development of China's higher education, the gradual popularization of general high schools, the decline of the score line from junior high school to senior high school, many students whose junior high school performance is not particularly ideal and whose knowledge foundation is weak enter the senior high school to study. Still have a few in junior high school mathematics study achievement is outstanding, enter high school to be in mathematics this discipline "falter" student, this makes study difficulty student increases ceaselessly. In the process of teaching, every teacher will face the problem of students with learning difficulties. In fact, the parents of students with learning difficulties are also worried about this, and even the problems of students with learning difficulties will cause social problems such as juvenile delinquency [1]. Although the students with learning difficulties are a small part of the whole student group, it is not easy to reduce them, so the transformation of students with learning difficulties has become a challenging thing. Therefore, based on the theory of multiple intelligences, this paper will study how to transform the Chinese first year students with mathematics learning difficulties.

II. Understanding of Students with Mathematics Learning Difficulties

"Students with learning difficulties" is the abbreviation of "students with learning difficulties". Sukhomlinsky, a famous educator, defined the students with learning difficulties as those with normal intelligence, but with learning disabilities and poor performance, who may be eliminated. At the same time, he pointed out that these students with learning difficulties mainly have the following four characteristics; (i) there is a lack of thinking development, and they can't see the connection between things; (ii) there is a lack of basic learning skills, such as reading ability, language expression ability; (iii) there is a lack of connection between basic knowledge, and the ability to use knowledge flexibly is weak; (iv) there are defects in non intellectual factors [2]. The definition of students with learning difficulties, according to the commonly accepted view in the current academic circles, refers to the students with normal intellectual development and low learning effect who fail to meet the basic requirements of school education.

III. Understanding of the Theory of Multiple Intelligences

In 1983, Gardner, a professor of educational psychology at Harvard University, put forward the theory of multiple intelligences. He believes that intelligence is multiple, and there are at least eight intelligences in every person: verbal intelligence, logic mathematics intelligence, vision space intelligence, kinesthetic intelligence, musical intelligence, interpersonal intelligence, intra-personal intelligence, naturalist intelligence and existence intelligence. Among them, existential skills were added later by Gardner.

A. *Verbal Intelligence*

It can effectively use language to describe events, express ideas and communicate with people. For the subject of mathematics, it is embodied in describing mathematical problems in mathematical language, effectively using properties, theorems and formulas to solve problems, and being able to explain actual phenomena to people through mathematical problems.

B. *Logic Mathematics Intelligence*

It is manifested in thinking by reasoning, like to ask questions and carry out experiments to find answers, find the rules and logical order of things. For mathematics, it is reflected in the logic of thinking when solving mathematical problems and the logical induction and summary when forming mathematical knowledge network.

C. *Vision Space Intelligence*

It shows the sensitivity to shape, structure, space, etc. and the ability to show them through plane figure and three-dimensional structure. For the subject of mathematics, it is reflected in the understanding of mathematical images and the abstraction of objects in life into three-dimensional space graphics.

D. *Kinesthetic Intelligence*

It mainly refers to the skill of adjusting body movement and changing objects with skillful hands.

E. *Musical Intelligence*

It shows the individual's sensitivity to music rhythm, tone, timbre and melody as well as the ability to express music through composition, performance and singing.

F. *Interpersonal Intelligence*

It refers to the ability to effectively understand others and their relationships, and communicate with others. For the subject of mathematics, it is reflected in asking for advice from teachers and cooperating with students.

G. *Intra-Personal Intelligence*

The performance of their own understanding, whether the objective evaluation of their own and then self-in-depth reflection, progress. For mathematics, it is reflected in the ability to analyze and evaluate one's own achievements, reflect on them, correct them and make progress.

H. *Naturalist Intelligence*

It shows strong exploration ability. For the subject of mathematics, it is reflected in the exploration of transforming problems in real life into mathematical problems.

I. *Existence Intelligence*

It is manifested in putting forward and thinking about life, death and ultimate reality.

In fact, these nine kinds of intelligence represent different potentials, and they are interrelated. If given the right incentives and training, these potential can develop to a very high level. The existence of the students with learning difficulties is mainly because their potential is not fully developed, so the effective way to transform the students with learning difficulties is to develop their intellectual potential and develop their comprehensive ability.

In addition, the theory of multiple intelligences is used to treat students with learning difficulties. According to Sukhomlinsky's classification of students with learning difficulties [3], the first category is the students with insufficient thinking development. From the perspective of the theory of multiple intelligences, the potential of this kind of students has not been developed. Teachers should stimulate the thinking potential of students. For example, some students' mathematical logic intelligence is not weak, but teachers and students have not found it. Finding and stimulating the potential can develop thinking. The second category is the lack of basic learning skills. From the perspective of the theory of multiple intelligences, such students may have advantage intelligence in other aspects, so they should be treated correctly. Third, the basic knowledge is lack of connection and the ability of flexible use of knowledge is weak. From the perspective of the theory of multiple intelligences, this kind of students have poor understanding ability, but they also have their own flash points, which can’t be ignored by teachers.

IV. The Causes of the First Grade Students with Mathematics Learning Difficulties in Senior High Schools in China

A. *The Internal Factors of Students Such as the Disjunction of Mathematical Thinking between Junior High School and Senior High School*

Compared with junior high school mathematics, senior high school mathematics has more knowledge content, and the teaching material content of junior high school and senior high school is partially disjointed, and the mathematics language is more abstract. In this case, the thinking of the freshmen who just entered the senior

high school often hinders the problem-solving when they are learning mathematics. In the process of problem-solving, the thinking always "gets stuck" in the middle. In the long run, the students will be afraid of mathematics learning and lose their interest and motivation. This is a great challenge for the freshmen who emphasize image thinking.

B. *Improper Teaching Methods of Teachers*

In the traditional teaching mode, teachers tend to be superior students in teaching methods, contents and speed. They tend to ignore the attitude towards the students with learning difficulties and ignore the degree of mastery and psychological feelings of the students with learning difficulties. As a result, the students with learning difficulties lose their motivation for learning mathematics, resulting in a decline in performance.

C. *Inaccurate Evaluation of Students*

In the traditional evaluation system, teachers often evaluate the quality of students' learning through homework, test and examination results. This single evaluation mode overemphasizes the screening and selection functions of examinations, neglects the incentive and feedback functions of evaluation. This kind of evaluation makes many students attach the label of "students with learning difficulties". Because of their poor academic performance, these students think that they are very poor in every aspect, lose interest in learning and abandon themselves.

V. THE TRANSFORMATION STRATEGY OF THE STUDENTS WITH MATHEMATICS LEARNING DIFFICULTIES IN THE FIRST YEAR OF SENIOR HIGH SCHOOL IN CHINA

A. *Establish a Scientific Multi Intelligence View, Drive the Weak Points of Intelligence with the Strong Points of Intelligence*

In a multi perspective, teachers should be good at observing, discovering and respecting students' individual differences. Teachers can determine freshmen's intelligence strengths by referring to authoritative questionnaires or through daily observation of students, so that students can know their own strong intelligence. Teachers can understand students' intelligence strengths and use students' intelligence strengths to drive students' intelligence weaknesses. In mathematics teaching, teachers communicate with students through mathematics language, which is the external manifestation of mathematics logic intelligence. However, some students' mathematics logic ability is weak, so there is a difference between the mathematics symbol form expressed by teachers and their cognitive structure, which makes them unable to link with the mathematics knowledge they have learned, thus leading to their learning difficulties [4]. If we use the theory of multiple intelligences, every student has his own advantages of intelligent. Teachers should fully tap their previously neglected intelligence, and with the help of advantage intelligence, drive the weak points of intelligence, so that it can play a greater role.

After understanding the intelligence of different advantages of different students with mathematics learning difficulties, it is necessary to train students' intelligence strengths and drive their intelligence weaknesses in practical teaching.

For students with strong verbal intelligence, teachers can use the history of mathematics and the stories of mathematicians to introduce new courses. For example, when learning the concept of function in the first grade of high school, teachers can explain it from the development process of the concept of function, from Leibniz

and Dirichlet in foreign countries to Li Shanlan in China, which are all what students need to understand. At the same time of storytelling, some functional knowledge can be interspersed. The students with strong verbal intelligence can improve their interest and memory in the learning process, which makes the students realize the understanding of mathematical knowledge through the understanding of characters. Through some lectures, we can also create conditions for students to read mathematics literature. This can not only transfer verbal intelligence to mathematical logic intelligence, improve students' understanding of mathematical language, but also help students develop good habits of reading when they enter the society in the future.

For students with strong spatial intelligence, teachers can create a visual learning environment for students to arouse their interest in learning. For example, by using multimedia courseware and teaching aids, students can draw pictures and make learning aids by themselves so that students can understand them directly and transform their original image thinking into abstract thinking. For example, in the class of "roots of equation and zeros of function" in the first grade of senior high school, teachers can use the images and properties of basic elementary functions (primary function, secondary function, inverse proportion function, exponential function, logarithmic function, power function) that students are familiar with, refine and abstract the relationship between equation $f(x) = 0$ and function $y = f(x)$ image and X-axis intersection, and then understand the grasping the concept of zeros of function and master the relationship among function zero, real number solution of equation, function image and X-axis intersection. Ask students to analyze and solve the problems related to the zero point of the function from two different angles: "shape" (function image) and "number" (existence theorem of function zero). In this way, through the original knowledge and experience and the combination of numbers and shapes, students can cultivate the core literacy of mathematical abstraction and logical reasoning, and improve their mathematical logic intelligence.

For students with strong musical intelligence, teachers can turn the teaching content into songs, mnemonic rhyme and so on for students to learn and master. For example, when learning "sets and functions" in the first grade of high school, teachers can formulate mnemonic rhyme for students to remember after they have learned the knowledge.

Content sub intersection and complement, and power index pair function. Properties parity and increase and decrease, the most obvious observation picture.

Complex functions appear, properties of the product rule, if you want to prove it in detail, you have to grasp the definition.

The exponential and the logarithm are inverse functions of each other. The positive number of the base is not 1.

The form of composing mnemonic rhyme and songs makes students not easy to forget, and makes students naturally transform musical intelligence into mathematical logic intelligence.

For students with strong interpersonal intelligence, teachers can let students cooperate in groups, discuss and explore, learn from each other's strengths and make progress together.

B. *Improve Teaching Methods and Promote the Combination of Superior Intelligence*

Teachers should have an overall teaching plan for different types of students according to the teaching content

not ignore the existence of students with learning difficulties, and let students with learning difficulties master the key knowledge and gradually break through the difficulties through reasonable and ingenious design. In solving mathematics problems, we should connect the knowledge of junior high school and senior high school, find the same and different points with the original knowledge and experience, so as to stimulate the students with learning difficulties to yearn for knowledge. In terms of teaching content, we should consider the cognitive differences between the students with learning difficulties and the students with excellent grades, and choose the teaching content with appropriate difficulty. According to the theory of multiple intelligences, we can use the advantages of group cooperative learning, inquiry learning and other teaching methods to improve the learning enthusiasm of the students with learning difficulties and promote the combination of the advantages and intelligence of the students with learning difficulties.

It is every student's instinct to be good at expressing themselves and promoting their personality. Students are eager to be recognized by teachers, classmates and parents. Cooperative learning has built a good platform for students to learn [5]. When learning logarithm knowledge in the first grade of senior high school, teachers can teach through group cooperation. In group cooperative learning, teachers can divide one excellent student, two middle-class students and one poor student into a group, and the overall level of each group is consistent. The teacher assigns tasks to each group member according to the student's advantage intelligence. Among them, the top students and the student of average academic achievement can explain and deduce the invention process of logarithm, and coordinate the further explanation that the whole group members can think independently and cannot understand. If the language intelligence of the students with learning difficulties in the same group is the dominant intelligence, you can consult the data of logarithmic invention or show the process or derivation of invention of the members in the same group finally. After each group's presentation, the teacher will give praise and suggestions for each group's presentation results. In this kind of cooperation, all students can learn from the advantages of other students and get a variety of ability exercises. Students with learning difficulties will also have a sense of learning achievement, which not only improves the mathematical logic intelligence, but also cultivates students' sense of participation and cooperation spirit.

C. *Pay Attention to Multiple Intelligence Evaluation and Promote Cognitive Intelligence*

According to the theory of multiple intelligences, the evaluation of students' academic performance should be from multiple perspectives. First of all, we should evaluate it from many aspects and angles. Teachers should not only evaluate the homework and examination, but also evaluate the performance, test, practical ability and innovation spirit of the students with learning difficulties in each stage, record their own learning path, and find the progress and deficiency of the students with learning difficulties to increase their confidence in learning. For example, the first compulsory textbook for senior high school students focuses on functions. Students with learning difficulties start to understand the nature of function learning to learn exponential functions, logarithmic functions, power functions, and function models. This is a gradual process. Students with learning difficulties may have great difficulties when they start to contact these knowledge, but in the process of recording students' performance, teachers should find out the deficiencies, cultivate students' learning habits, guide students' learning methods, and gradually reduce students' difficulties and the gap with other students. Secondly, the evaluation should pay attention to the process. In the process of students' growth, teachers evaluate students, give feedback to students in time, let students know themselves in time, and improve their

enthusiasm for learning. Finally, evaluate the diversity of the subject. From multiple perspectives, the comprehensive, objective and scientific evaluation of educational activities should be carried out. From the original only teacher evaluation to the present, not only teachers participate, but also parents, classmates and themselves should participate in the evaluation. Especially for the parents of the students with learning difficulties, the parents often put their children's academic performance in the first place when the students enter the high school, and the evaluation of the children is often based on learning. Under the condition of not knowing students' heavy learning tasks and students' psychological conditions, pressure is constantly exerted on children, which reduces their enthusiasm for learning. Therefore, home-school cooperation is also the key to training students with learning difficulties. The comprehensive evaluation is helpful for students to reflect on themselves and improve their learning efficiency and form a virtuous circle [6]. The multiple evaluation methods overcome the limitations of traditional evaluation methods to measure different students on the same scale, which is conducive to the conversion of students with learning difficulties.

V. CONCLUSION

In summary, based on the theory of multiple intelligences, this paper makes a comprehensive analysis of the causes of Chinese students with math learning difficulties in grade one. It puts forward the transformation strategies for the students with math learning difficulties in the first grade and enumerates the methods for teachers to use these strategies in classroom activities. In a word, the first year of senior high school is a special stage connecting junior high school and senior high school, which leads to the increasing number of students with math learning difficulties in senior high school. Therefore, the effective use of these strategies plays an important role in the transformation of students with math learning difficulties. However, the transformation of students with learning difficulties is a long-term and arduous task. As a teacher, we still need to continue to improve this job, so that the students with learning difficulties in senior one can gain and make progress in their study.

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