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Research on the Training of Knowledge Transfer Ability of Chinese Senior High School Students from the Perspective of Mathematics Core Literacy

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Abstract **– Knowledge transfer is an indispensable part of cultivating students' core mathematical literacy. Knowledge transfer ability plays an irreplaceable role in students' knowledge learning and self-development. This paper expounds the relevant theories of knowledge transfer and the factors affecting students' knowledge transfer ability, and puts forward the five suggestions: reasonably organizing the content of textbooks to help students establish a reasonable cognitive structure; guiding students to find common elements to promote transfer; skillfully setting up questions to improve students' generalization ability; reasonably utilizing stereotyped function and adopted to reduce negative transfer; improve teachers' quality.**

Keywords **– Core Literacy, Knowledge Transfer, High School Mathematics.**

I. INTRODUCTION

The Ministry of Education of the People's Republic of China's General High School Mathematics Curriculum Standard (2017 edition) puts forward six core mathematic accomplishments: mathematical abstraction, logical reasoning, mathematical modeling, intuitive imagination, mathematical operation and data analysis, and divides each accomplishment into three levels. The division is based on three different levels of senior high school students, namely, high school graduation level, college entrance examination level and development level. This level division has little guiding significance for the daily evaluation of senior high school mathematics teaching. In order to solve this problem, Yu Ping, a professor of Nanjing Normal University, divides the core competence of mathematics into three levels: knowledge understanding, knowledge transfer and knowledge innovation according to the three forms of mathematical knowledge learning. This level division has strong operability [1]. From the above three levels, we can see that knowledge transfer is an indispensable link to realize the leap from knowledge understanding to knowledge innovation. To cultivate students' ability of knowledge transfer is the premise and guarantee of cultivating students' core mathematical literacy.

Knowledge transfer runs through the high school mathematics curriculum all the time. Looking at the college entrance examination questions in recent years, more and more attention has been paid to examining students' ability to solve innovative problems by using existing knowledge. And improving students' knowledge transfer ability can effectively help students deepen their understanding of knowledge and provide support for solving innovative problems. The study finds that the knowledge transfer ability of most senior high school students in China is not high enough, which is reflected in the slow acceptance of new knowledge and the unclear way of solving problems. Therefore, how to cultivate students' knowledge transfer ability is a topic worthy of our consideration.

II. Understanding of Knowledge Transfer

Knowledge transfer refers to the influence and effect of knowledge previously learnt on knowledge later learnt. Knowledge transfer ability refers to people's ability to use the acquired knowledge and skills to learn, analyze, understand, master new knowledge and produce new skills [2].

According to different standards, the classification of knowledge transfer is different. According to the transfer effect, knowledge transfer can be divided into positive transfer and negative transfer; according to the migration direction, knowledge migration can be divided into forward migration and reverse migration; according to the mode of migration, knowledge migration can be divided into special migration and Non-special migration; according to the general level of transfer, knowledge transfer can be divided into horizontal transfer and vertical transfer [2]. The ability of knowledge transfer can help students improve their learning efficiency, help them to apply what they have learned, help them to cultivate their mathematical thinking, and help them develop their thinking of solving problems [3]. Good knowledge transfer ability can help students to establish a systematic knowledge system, form a stable, clear and usable mathematical cognitive structure, effectively generate new knowledge through "re-creation" to self-new knowledge, and help students to constantly generalize and department the knowledge they have learned. In this process, the mastery of mathematical knowledge and skills can be realized and transformed into mathematical ability.

Knowledge transfer ability plays an important role in intentional learning. In the process of intentional learning, learners need to establish a non-artificial substantive relationship between new knowledge and relevant content in the existing knowledge structure, that is, between new and old knowledge, which is essentially the influence of existing knowledge on new learning, i.e. transfer.

III. Influencing Factors of Knowledge Transfer Ability

1. *Students' Mathematical Cognitive Structure*

Bruner believes that cognitive structure helps students transfer knowledge. Mathematical cognitive structure is the organizational form of students' existing mathematical knowledge and experience, and knowledge transfer is carried out on the basis of students' existing knowledge. Therefore, students' good mathematical cognitive structure plays a positive role in promoting knowledge transfer.

2. *There are Common Factors among the Learning Objects*

The theory of common elements holds that only when there are common elements and common elements between the two kinds of learning can migration occur. One of the basic conditions for the transfer of common elements is learning content, learning methods and learning attitude. The more common elements in learning content, the more obvious the phenomenon of positive transfer. The more common elements in learning methods, the more obvious the phenomenon of transfer. At the same time, learning attitude is also an important factor affecting transfer.

3. *Students' Level of Generalization of Existing Experience*

The higher the level of generalization of existing experience, the greater the possibility of migration. Generalization theory holds that the necessary prerequisite for the generation of transfer is the common component

between the two learning activities, and the key to the generation of transfer is that learners generalize the common principle between the two activities [4]. Students' knowledge transfer is based on existing knowledge and experience, experience new things and find similarities. If the level of generalization of existing experience is high and it can reflect the essence of things, the migration will be smooth, otherwise, it will cause difficult or wrong migration. Therefore, teachers must attach importance to the main principles and general knowledge [5].

4. *The Role of Setting*

Setting, also known as the subconscious, is the preparation of certain psychological activities to set up or determine the impact of similar follow-up trends of psychological activities. The influence of stereotyping on migration may be either positive or negative [5]. When the stereotyping effect is consistent with people's thinking, it will promote the solution of the problem, and vice versa, it will interfere with it. Therefore, in practical teaching, teachers should adopt appropriate methods to overcome negative stereotypes, in order to achieve the purpose of promoting students 'knowledge transfer.

5. *Intelligence and Age*

Generally speaking, students with higher intelligence level are better able to find the connection between knowledge and find the way and opportunity of transfer than those with lower intelligence level. The older the students have, the wider their knowledge and the stronger their thinking ability, thus the greater the possibility of knowledge transfer. With the increase of age, students' intelligence level is also increasing, and with the increase of experience, students will be more easily to apply existing knowledge to new situations, that is, to conduct extensive knowledge transfer.

Of course, besides students 'own factors, teachers' own qualities and teaching methods will also have an impact on students' knowledge transfer ability.

IV. Teaching Strategies for Improving Knowledge Transfer Ability

According to the above knowledge transfer theories and the influencing factors of knowledge transfer, the following teaching strategies are put forward to improve the ability of knowledge transfer:

1. *Reasonable Organization of Textbook Content, help students to establish a reasonable Cognitive Structure*

Teachers can organize teaching content independently according to the characteristics of students, arrange the order of teaching content reasonably, and help students to establish a cognitive structure which is convenient for knowledge transfer.

For example, compulsory one mainly studies the monotonicity, periodicity, maximum and zero of functions, while compulsory four studies monotonicity, periodicity, maximum and zero of trigonometric functions. Then, after completing compulsory one, students can continue to learn the content of compulsory four and establish a good cognitive structure, so that students can better transfer the functional knowledge of compulsory one to the learning of compulsory 4-triangle function. At the same time, it also cultivates students' core qualities of mathematical abstraction.

2. *Guiding Students to Find Common Elements and Promote Migration*

At the stage of preparing lessons for new knowledge, teachers should find the connection between new knowledge and old knowledge, life reality and other known contents of students, help students find the entry point of transfer, and promote students' knowledge transfer.

For example, in the teaching of ellipse definition, teachers can lead students to recall the definition of circle that they have learned before, that is, the figure composed of all points whose distance from a plane to a fixed point is equal to a fixed length is called a circle, and then introduce the definition of ellipse that the sum of the distance from a plane to a fixed point is equal to that of all points whose length is equal to an ellipse. There are common elements among the two definitions, which can promote students' knowledge transfer. At the same time, it also cultivates students' intuitive and imaginative core qualities of mathematics.

3. *Skillfully set up Questions to Improve Students' Generalization Ability*

The problem types of high school mathematics can be summarized according to knowledge points or thought methods. Guiding students to generalize the problem types can not only improve students' generalization ability, but also improve students' problem solving ability and promote knowledge transfer. In the initial stage, the students need to be guided by the teachers. After a period of training, they can be given the students to generalize independently.

For example, for the problem of the sum of the first n terms of the equal-difference sequence and the equal-ratio sequence, we can classify them according to the given conditions, such as the formula, the recursive relation or the relation between the term and the item, and summarize the solving methods of different types of questions. At the same time, it also cultivates students' core qualities of logic reasoning.

4. *Reasonable use of Fixed-Point effect to Reduce Negative Migration*

The generalization of questions can improve students' generalization ability, but it adds students' stereotyped thinking invisibly, which can easily lead to negative transfer under certain circumstances. Therefore, in the process of teaching, teachers should make rational use of the role of stereotype to reduce the negative transfer.

5. *Improve the Quality of Teachers Themselves*

Teachers' exemplary role is self-evident. Therefore, teachers should improve their own quality and have a higher ability of knowledge transfer. In preparing lessons, students' knowledge and experience should be fully considered, knowledge transfer scenarios should be reasonably established, and appropriate teaching methods should be used to improve students' knowledge transfer ability.

To sum up, knowledge transfer ability plays an irreplaceable role in high school mathematics learning. Teachers need to choose reasonable teaching methods according to students' own characteristics to promote students' knowledge transfer ability.

V. CONCLUSION

Under the background of mathematics core literacy, knowledge transfer ability plays an important and irreplaceable role in high school mathematics learn In mathematics teaching, teachers should pay attention to the improvement of their own quality, adopt appropriate teaching methods to help students improve the ability of knowledge transfer, and lay a good foundation for students' future learning.

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