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Thinking on the Teaching Implementation of "Synthesis and Practice" in Junior Middle School Mathematics Based on Situational Cognition Theory

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Abstract: *"Synthesis and practice" is one of the important teaching contents in mathematics curriculum since the new curriculum reform. Through "synthesis and practice" is helpful to improve students' core quality of mathematics. Situational cognitive theory is a learning theory with extensive influence formed in the middle and late 1980s. Through consulting the existing literature, it further expounds the situation on the basis of understanding the situational cognitive theory, and the enlightenment of cognitive theory to the teaching implementation of "synthesis and practice" in junior middle school mathematics. For example, creating real life situation, restoring the essence of mathematics; establishing mathematics learning community cooperative learning; project integrating multiple situation teaching.*

Keywords: *situational cognition; community of practice; legal marginal participation; synthesis and practice*

1. Foreword

"Compulsory education mathematics curriculum standard (2022 edition)", points out that by learning mathematics knowledge, students should have the ability to link mathematics and other disciplines and life, need on the basis of basic knowledge and practical skills, cultivate rigorous scientific attitude, develop good learning habits, improve the ability to solve the problem [1]. "Comprehensive and practice" is an important content of junior high school mathematics teaching, which has a great influence on students' core quality, thinking ability and comprehensive ability. Junior high school is an important stage for students to obtain the "four bases" needed to adapt to social life and carry out deeper development. However, at present, due to various reasons, the teaching quality of "synthesis and practice" in junior middle school mathematics is generally not high, which affects the improvement of students' core quality of mathematics. Scholar Liu Li made in-depth discussions on the "comprehensive and practical" teaching of junior middle school mathematics from different perspectives, and found that there are difficulties in practical teaching, teachers lack professional training of this course teaching, pay insufficient attention to it, and the course form is relatively single [2]. Through the analysis of the current situation of the "synthesis and practice" activities of junior middle school mathematics, Zhu Lili found that some teachers are lack of understanding, lack of experience and necessary guidance and fail to dig deep into the content of the activities [3].

2. Overview of the situational cognitive theory

2.1. Contextual cognition theory

From the initial germination to the current perfection, the situational cognition theory (situated cognition) has experienced a long and tortuous development process. Based on the relationship between individual and society, it constantly explores the theory and applies it to many fields such as educational psychology and human cullology, providing a new perspective for the academic circle.

Reznik gave a lecture on Learning in and out of School in 1987. Reznik pointed out that social education pays more attention to cultivating students' independent thinking ability, and pays more attention to practical education. In 1989, the book "Contextual Cognition and Learning Culture" was published in the journal Educational Investigator, written by Brown, Collins and Dugid. The core idea of this paper is that the existence of knowledge must be based on a specific environment, conditions and

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culture, and become more important over time. Through continuous exploration, practice and reflection, we can better understand the world, so as to obtain more experience, more deeply understand its essence, so as to constantly improve their own ability.

With the continuous frontier of the development of human society, the anthropologists represented by Lev (Love) are constantly exploring and developing the related theories about situational cognition and learning. In 1984 and 1988, she published "daily cognition: the development of social situation" and "the practice of cognition: psychology, mathematics and daily life culture", and her most famous works "situational learning: legal borderline participation" is published in 1991, these books are profoundly affect the current education research about situational cognition and learning. Through the investigation of tailor manual apprentices, Lev found the educational value of "tacit knowledge", thus clarifying the concept of "legitimate borderline participation", the famous judgment of situational cognition theory.

Context refers to the interwoven factors constituting and contained in the situation and their relationship. Situational cognition theory emphasizes that learning is not a passive activity, but a process in which individuals actively participate in practice, interact with others, and the environment. Professor Yao Meilin analyzed the reform of learning paradigm from the perspectives of cognitive theory and situational theory, he believed that learning from representation to participation in practice, learning content from cognitive ability orientation to practical ability and socialization orientation, learning mode from individual construction to interaction, and learning application from school orientation to social orientation [4]. On the basis of situational cognition theory, Yu Ping believes that mathematics teaching concept pays attention to the situational factors in teaching, emphasizes participatory learning, and advocates the establishment of practice community [5]. Chen Bei et al. believe that the situational cognition theory in teaching, human cognition is inseparable from the situation, students are the participants of learning, and develop practical ability in the situation [6].

In general, learning not only refers to the individual's mastery of certain knowledge and skills, but also refers to a process in which individuals gradually form the ability to participate in practical activities in the process of participating in practical activities, so as to constantly improve their own socialization level. The situational cognition theory emphasizes that the relationship between the individual and his environment is a dynamic whole, and the physical and mental individual's activities and his environment are a part of it. Contextual cognition theory aims to provide students with a way to participate in inquiry learning and help them establish a positive self-identity. In teaching, teachers can use group discussion and collaborative learning, classroom dialogue, support teaching, cognitive apprenticeship and other methods. Such an environment gives students an opportunity to think critically about their own ideas, and also helps them to establish a positive self-identity. In group activities, students can understand each other's ideas under different social cultures.

2.2. Elements of situational cognitive learning

2.2.1. Situation-based learning

All learning occurs in the context, learning can never emerge from the specific context, the context is an important and meaningful part of the whole learning. In the process of learning, the situation is often presented as a very specific object. At the same time, because the situation has certain characteristics, the learning of learners in the specific situation is also different from the learning of them in other situations. Knowledge is a situation and develops continuously in the activity. Learning activities mean that individuals actively participate in practical activities to maintain a dynamic, interactive and dynamic adaptability with the environment. This adaptability is manifested not only in changes in behavior, but also in psychological and cognitive states. In this process of adaptation, individual behavior, psychology and cognition influence and promote each other, and they develop separately in the interaction.

2.2.2. The construction of a community of practice

Practice community is an important concept in situational learning theory. In practice community, members can provide information and resources to each other, and jointly participate in a specific learning task to promote the interaction between individuals and the environment, so as to improve the application level of knowledge and skills. Leiv et al. defined the practice community as a group that pursues common goals, engaged in practical activities together, and shares common beliefs and understanding in practical activities. From this point of view, any space-based group is not necessarily a community of practice. The community of practice has a common task, which is to complete the tasks under the action of certain tools, resources and material conditions. This community has a common

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cultural and historical tradition, and is an interdependent system, with its own independent actions, and its various components are interdependent with each other. At the same time, it also has the ability of reproduction and circulation. Efficient learning is not in building behind closed doors, but in finding their own community of practice.

2.2.3. Legal and borderline participation

Context-based learners must be "legitimate" participants whose activities occur in the context of community work and are not passive observers. "Edge participation" means that learners are unable to fully participate in community activities as novices in their learning process. It is necessary to learn through the observation of expert activities and the discussion with community members and experts. In this learning community, experts will not feel uneasy or threatened by learners because of their potential. Instead, they will try to impart the knowledge and skills they have mastered to learners, so that each community member will exert their maximum potential and get sufficient support and help. The term "participation" refers to the construction of knowledge in the process of interaction with experts and community members in the specific real environment in which the knowledge is generated. To this end, legitimate marginal participation is the mechanism by which learners acquire culture, including not only between community members and experts, but also with other participants, symbols, skills and opinions.

3. The Teaching Implementation Strategy of "Synthesis and Practice" in Junior Middle School Mathematics Under the Guidance of Situational Cognition Theory

3.1. Create real life situations and restore the essence of mathematics

In real life, many knowledge can be very well applied to classroom teaching. However, due to various reasons, many teachers have deficiencies in this regard. However, if a real life situation can be created, students can enter the study more quickly, fully mobilize the desire for exploration and knowledge, and help them to better focus on their own learning. Therefore, in the junior high school mathematics "comprehensive and practice" teaching, teachers should take the observation and understanding of students 'actual life as the basis, with the creation of life situation as the basis, select the excellent material closely related to students' life, with the role of education, in order to create a real life situation. This kind of teaching material has a strong attraction, it can cause a strong emotional resonance of students, let them realize the importance of learning mathematical knowledge, and then stimulate their enthusiasm for mathematical learning.

The generation and development of mathematical knowledge cannot be separated from people's real life, but due to the high abstraction of mathematics, mathematics becomes a little boring. Therefore, in the teaching, teachers should return to the occurrence and development of mathematical knowledge to the real life, and restore the process of its formation. In junior middle school mathematics "comprehensive and practice" teaching, teachers can on the basis of following the principle of situational teaching, and the students 'life closely together, to the students' life experience and have mastered knowledge as a starting point, make the students in the process of solving the problem of mathematics, realize the mathematics and People's Daily life there is a close connection, realized the wide application of mathematics in real life. Teachers should start from the things that students are familiar with and interested in, create real life situations, guide students to explore and practice independently, and let students abstract mathematical models from specific problems.

In this life case, there are how many people in the activity group, students are easy to think of through the equation. If the teacher proposes to increase or decrease, how can we discuss the situation? In order to improve the learning effect, teachers need to provide them with sufficient opportunities to encourage them to have independent discussions, and also to provide a platform for them to help each other and explore together. In this way, they can make more effective use of their knowledge, improve their practical skills, and cultivate their innovative spirit and mathematical core literacy.

3.2. Establish a mathematics learning community for cooperative learning

Teachers and students are a learning community. In the teaching of "synthesis and practice" in junior middle school mathematics, the interactive relationship between equal listening and dialogue should be established. Students are the main body of the whole teaching activity, and the situation is real and daily life and practice are closely linked. To establish a mathematics learning community, it is necessary to clarify the teaching objectives, carry out effective cooperative teaching behavior, establish an effective

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activity management system, and use a scientific and diverse activity evaluation system under the guidance of the common expectation. According to the enlightenment in the practice community in the situational cognition theory, the knowledge and experience of each member in the learning community are different, which requires teachers to build a mathematical learning community according to the differences of knowledge and experience among the members in the learning community, which can promote the effective cooperation among students. In the comprehensive practice activities of mathematics learning community, there are various evaluation methods, but no matter what kind of evaluation method is inseparable from the observation, recording and description of students in the activities.

Taking "Measuring the height of the flagpole" as an example, before carrying out the comprehensive practice activities, the teachers guide the students to establish the teaching objectives together, and each group conducts effective communication and discussion to make a scheme design and optimize it. Then, take the group as the unit, each group should prepare the collection tools, such as: 1m and 1.75m long bamboo pole, measuring ruler, data record table, etc., and the group leader will arrange the division of labor of the members of the group. Suppose that there are 6 members in a group, only 1 student needs to fill in the data record form, 3 students measure the height of the bamboo pole with its shadow length, and 2 students measure the shadow length of the flagpole. In addition, the group should fill in the comprehensive practice activity report according to the measurement data and communicate with the members of the mathematics learning community. After the activity, the members of the mathematics learning community will make a corresponding evaluation of the overall activities, and actively guide the students to make a correct evaluation of their own activity process and summarize the activities.

3.3. Project-type integration of multiple situational teaching

Different situations have different values and characteristics, and some situations cannot fully reflect the comprehensiveness and practicality of "synthesis and practice" when used alone. Therefore, teachers can innovate situational teaching based on the integration points and common points of different situations, and obtain better teaching effects through multiple integration and superimposed use.

In the leverage in the leverage, for example, in grade eight, the students have learned a function, in grade nine, and learned secondary function, so that the students of function concept has a basic understanding, is in the study function, accumulated certain methods, and use the idea of function to solve the problem. At the same time, with the continuous enrichment of students' physical knowledge, they have a certain understanding of the physical quantities that represent the inverse proportional relationship, which is helpful to further understand the application of the inverse proportional function. Teachers provide learning support based on the previous experience of members of the mathematics learning community, which can effectively help the community to improve cohesion and cultivate metacognitive ability, and promote the realization of common goals.

4. Conclusion

Due to the lack of practical experience in the teaching implementation strategy in this paper, we hope that education experts and frontline teachers can further study the "synthesis and practice" of junior middle school mathematics and give full play to the educational value of this module.

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