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Research on how to use mathematics textbooks reasonably in mathematics teaching in China

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Abstract
Mathematics textbooks are the process of dredging and reorganizing the content of subject with syllabus as a system, which embodies the key and difficult points of teaching content. Mathematics textbooks, as the most important reliance and teaching resources of teachers and students, play an irreplaceable role in transferring mathematical knowledge, carrying out teaching activities, achieving teaching objectives and cultivating students' core literacy of mathematics. Therefore, it is necessary for us to reform mathematics education in accordance with the concept of current curriculum standards, to explore how teachers should use textbooks rationally, how to develop and utilize mathematical materials on the basis of respecting textbooks, and how to make the classroom glow with vitality. In recent years, many front-line teachers and university scholars have conducted extensive researches on how teachers use textbooks from different perspectives, and obtained many research results. Generally speaking, they mainly studied three aspects of teachers' "learning" textbooks, "researching" textbooks and "creating" textbooks. These studies provide a reference for teachers to use and deal with textbooks reasonably. In order to further promote the study of better use of textbooks in mathematics teaching, this paper will make a summary from three aspects: "learning" textbook, "researching" textbook and "creating" textbook. For teachers, it helps front-line teachers better understand the intention of editors, fully explore the potential value of textbooks, and creatively use textbooks. For students, it can also promote the cultivation of students' core literacy and prepare further research in the future.

Keywords: mathematics teaching, mathematics textbook, core literacy of mathematics

1. Introduction
Mathematics textbook is an important textual foundation to study mathematics, and the task of implementing the core literacy of the students can not be separated from the textbooks. "Mathematics Curriculum Standard in General Senior High School" pointed out that mathematics textbooks provided learning themes, basic clues and specific contents for "teaching" and "learning" activities. They were important teaching resources for realizing the objectives of mathematics curriculum and developing students' core literacy of mathematics discipline (Ministry of Education of the People's Republic of China, 2017) [1]. At present, a series of related academic researches have emerged in China on how to tap the potential value of textbooks and how to use textbooks well. Generally speaking, they mainly studied three aspects of teachers' "learning" textbooks, "researching" textbooks and "creating" textbooks. These academic studies have undoubtedly greatly promoted the practice of teachers using textbooks reasonably in teaching.
In order to learn experience and lessons from previous studies and further enrich the research on the rational use of textbooks in teaching, this paper will summarize the above three aspects to pave the way for the follow-up research.

2. Better Use of Textbooks in Mathematics Teaching
2.1 "Learning" Textbooks
Chen Tao believed that teachers should first acquire textbook knowledge by chapters, break through each knowledge points and internalize them into their own knowledge. Then teachers should sort out the relationships between knowledge points in the whole chapter and form a knowledge network. Finally, teachers should analyze the relationships between the whole book. In this way, teachers could be more skillful in the classroom, rather than completely copy textbooks (Chen, T., 2017) [8]. Liu Ruiyou believed that teachers should first acquire textbook knowledge carefully and internalize it, which was the premise of rational use of textbooks (Liu, R.Y., 2014) [9].

2.2 "Researching" Textbooks
2.2.1 Teachers Should Study the Intention of Compiling Textbooks
Yu Jianping, Zhao Dong and Liu Li believed that the research on the the intention of compiling the textbooks was based on the premise of using the textbooks reasonably. Teachers should understand the intention of compiling the textbooks of this period, year and chapter as a whole, and then focus on the elements of certain content. Only in this way could we grasp the whole and part clearly, achieve a definite goal, and avoid the phenomenon that only trees could be seen but forests could not be seen in teaching and learning (Yu J. P., 2015; Zhao, D., 2011; Liu, L., 2011) [2, 3, 4]. Lin Mei and Chen Tao believed that only by fully interpreting the textbooks and deeply understanding the intention of compiling could teachers better use the textbooks in teaching (Lin, M., 2017; Chen, T., 2017) [5, 8]. Zhang Jing believed that teachers should start from the whole textbook when they study textbook, understand the intentions and specific contents of each textbook, and avoid unnecessary repetition or disconnection in teaching (Zhang, J., 2019) [17].

2.2.2 Teachers Should Study the Breadth, Depth and Difficulty of Teaching Content

Yu Jianping and Gao Yanling believed that teachers should clarify the knowledge context and logical relationship again, and effectively analyze the knowledge context, such as the key points of teaching, the connection points and growth points of old and new knowledge, the expansion points of recent development areas and the key information in textbooks. At the same time, teachers should extend the textbooks forward and backward. Only in this way could teachers accurately grasp the breadth, depth and difficulty of teaching content, and make textbooks truly an inexhaustible source of students' learning (Yu, J. P., 2015; Gao, Y. L., 2017) [2, 6]. Chen Tao believed that teachers should study the breadth, depth and difficulty of teaching content, which would avoid the phenomenon of "students can't eat enough" and "not enough to eat" (Chen, T., 2017) [8]. Zhang Jing and Ji Fuxian believed that teachers should go deep into the arrangement of textbooks and the breadth, depth and difficulties of teaching contents. For example, students need a transition period from junior high school to senior high school psychologically. At the same time, compared with junior high school mathematics, the functional part of compulsory high school mathematics textbook 1 has improved qualitatively in abstraction, generality and profundity. Subsequently, students will learn the content of solid geometry, which will add a threshold to the students. This required teachers to make appropriate adjustments to the arrangement order, key and difficult points of mathematics textbooks according to their learning conditions. It could not only disperse difficulties, but also slightly buffer tense class hours (Zhang, J., 2019; Ji, F. X., 2017) [17, 24].

2.2.3 Teachers Should Explore Hidden Resources

Yu Jianping believed that because of space, system and other reasons in mathematics textbooks, some contents were simplified or discarded. Teachers should dig out these hidden gaps in time so that students could experience the process of re-creation, which could also increase the value of textbooks (Yu, J. P., 2015) [2]. Chen Tao and Zhang Qianbi believed that mathematical thinking and methods were implicit teaching resources. Teachers need to understand textbooks thoroughly and comprehensively on the basis of studying them, so as to understand and excavate the thinking and methods in the textbooks (Chen, T., 2017; Zhang, Q. B., 2013) [8, 13]. Wei Jingbo and Luo Huahua believed that teachers should not only thoroughly understand the basic knowledge in textbooks, but also pay attention to digging out the basic mathematical skills and mathematical thinking methods contained in explicit knowledge (Wei, J. B., 2017; Luo, H. H., 2019) [18, 19]. Zou Bingqiu believed that explicit knowledge could be acquired by reading because of specific knowledge points, but implicit knowledge could not be acquired by reading because there were no specific knowledge points. This required teachers to fully tap the mathematical ideas hidden behind explicit knowledge, and penetrate and clarify the mathematical ideas when teaching explicit knowledge points (Zou, B. Q., 2018) [20].

Ge Chunli believed that there was much knowledge of history of mathematics hidden in the knowledge of textbooks. Teachers should fully tap these materials and properly expand them on the basis of respecting history. They could not only fully mobilize the enthusiasm of students, but also enliven the classroom atmosphere. The most important thing was that they would also have some influence on students' outlook on life and learning (Ge, C. L., 2006) [14]. Wei Jingbo and Gao Qichen believed that teachers should excavate tacit knowledge of textbooks and permeate mathematical culture through activities such as "thinking", "inquiry" and "reading" in each chapter of textbooks. Such as "Diophantine", "Yang Hui Triangle and the Power of Two Sums", "Descartes", "Fermat and His Conjecture". Teachers should guide students to participate actively in the process of thinking and answering these questions, make them form their own views and cooperate and exchange, and obtain corresponding mathematical conclusions through rigorous logical reasoning (Wei, J. B., 2017; Gao, Q. C., 2019) [18, 25].

2.3 "Creating" Textbooks

2.3.1 Teachers should create learning materials

Chen Tao and Jia Lan believed that it was difficult to combine the local characteristics with the textbooks because of the influence of many factors such as regions, economies, cultures and environments. Therefore, teachers should draw materials locally based on local reality and existing experience, set up the situation skillfully, and create the starting points of teaching materials and real life, which would enrich the teaching content (Chen, T., 2017; Jia, L., 2010) [8, 11]. Wei Yanfei and Ji Fuxian believed that the universality of textbooks was too strong to arouse students' interest in learning. This required teachers to add regional learning materials to textbooks so as to stimulate students' enthusiasm for learning in the light of the actual situation in teaching. For example, in the formation of derivative concept, the textbook was introduced through life examples such as balloon expansion rate, high-platform diving, etc. This kind of textbook was natural and friendly, which reflected the concept of curriculum standards, and helped students to understand the value of mathematics, understood the formation process of knowledge, and stimulated their enthusiasm for learning (Wei, Y. F., 2019; Ji, F. X., 2017) [22, 24]. Bai Aifang and Zhao Yuan believed that for some rigid and difficult materials in the textbooks, teachers should process the learning materials according to their own experience and knowledge, or add some materials which were not shown in the textbooks to the teaching as much as possible (Bai, A. F., 2015; Zhao, Y., 2010) [7, 10]. Yang Jian believed that mathematics textbooks had the large span between primary and secondary schools, which required teachers to create some transitional learning materials according to their learning conditions, and to make good links between grades. This would not only make teaching more smoothly, but also help students better understand and master the knowledge they have learned (Yang, J., 2018) [23].

2.3.2 Teachers should reorganize learning materials

Chen Tao and Xie Huailin believed that some examples in textbooks were too redundant; some knowledge could be learned ahead of time, which was more conducive to students' learning and understanding; some comprehensive examples involving more knowledge and more difficult problems could be put back. If the teacher forcibly puts them here, the students will not accept them. This would interfere with students' understanding and mastery of this

part of the knowledge. So teachers should add, delete and adjust examples and exercises reasonably according to students' actual cognitive level and learning conditions (Chen, T., 2017; Xie, H. L., 2012) [8, 15]. Wei Yanfei believed that in order to stimulate students' enthusiasm, teachers could reorganize learning materials, disrupt the order of examples and exercises, and let students solve the following problems. Then, the students would be explained the supplementary knowledge, so that when they went back to solve the easy problems after solving the complex problems, they would find that the previous problems could not be regarded as a difficult problem. For example, the simple an operation of "25×16" could be changed to "25×4×4". After students mastered this rule, the teacher asked students to calculate "25×5×2", and students could quickly figure out the final result (Wei, Y. F., 2019) [22]. Zhang Shaodong and Ji Fuxian believed that examples and exercises in textbooks were compiled by textbook compilers according to syllabus, careful research and students' learning characteristics. Teachers should supplement, modify, delete and exchange textbooks according to the criteria of curriculum standards so as to achieve the goal of creative use of textbooks. For example, there was no second definition of conic curve in the conic section. After finishing the chapter of "Curve and Equation", teachers could put the two topics of "First and Second Definitions of Conic Curve" in the textbook together for students to observe. By comparing the different ways of solving problems, the second definition of conic curve was introduced. It could not only enrich the textbooks, but also make them more flexible and profound (Zhang, S. D., 2019; Ji, F. X., 2017) [21, 24]. Yu Jianping, Lin Mei, Xie Huailin and Wang Aiping believed that teachers could make some changes to the existing exercises or examples of textbooks by means of "supplement", "replacement" and "adaptation", so as to make the topics more diversified and rich in content. At the same time, teachers could also help students connect knowledge in series, summarize questions and rules, and give full play to the effect of demonstration (Yu, J. P., 2015; Lin, M., 2017; Xie, H. L., 2012; Wang, A. P., 2014) [2, 5, 15, 16]. Liu Ruiyou and Zhou Yufeng believed that in order to give full play to the maximum value of textbooks, teachers should deal with textbooks boldly and creatively, replace and update them or even reorganize or adapt them according to the reality of life and students' experience (Liu, R. Y., 2014; Zhou, Y. F., 2019) [9, 12].

3. Comment on current studies

To sum up, it can be seen that the current researches on the rational use of Mathematics Textbooks in mathematics teaching mainly focus on three aspects: "learning" textbook, "researching" textbook and "creating" textbook. For the "learning" textbooks, scholars have fully affirmed that teachers themselves learned through textbooks were the premise of rational use of textbooks; as far as the "researching" textbook are concerned, scholars have studied them extensively. It not only pointed out that teachers should study the explicit resources such as the intention of compiling textbooks, the breadth, depth and difficulty of teaching contents, but also pointed out that teachers should tap the implicit resources such as mathematical thoughts and methods, so as to promote teachers to study textbooks well; for the "creating" textbook, current research not only pointed out that teachers should create learning materials according to local reality and students' interests, but also pointed out that teachers should reorganize learning materials according to students' cognitive structure, which was the key for teachers to grasp the textbook reasonably and train students. None of these studies were not reasonable.

However, from the above analysis, it can be seen that after the new curriculum reform puts forward the core literacy of the discipline, the research on how teachers should reasonably use textbooks from the perspective of cultivating students 'core literacy of the discipline is still blank. The obvious problem is that the core literacy of mathematics is given by the revised group of senior high school mathematics curriculum standard from the "pure mathematics" level, which is relatively abstract. Meanwhile, to a great extent, the textbooks have greatly restricted the teaching content, the teaching difficulty and even the whole teaching process of the teachers, which makes the teaching of teachers not operable. Therefore, it is a very worthy of in-depth study for some specific measures to help teachers use mathematics textbooks reasonably. Secondly, as for the research on teachers' rational use of textbooks, most of literature have been published earlier and are theoretical, while students are in constant changes, which leads to the fact that these theories have little reference value to teachers' teaching. Although these problems had been recognized and mentioned by some researchers, few people have conducted in-depth research from this perspective. As a result, most front-line teachers are unable to actively respond to the concept of the new curriculum reform, understand the editor's intentions in depth and grasp the content of the textbook thoroughly and still follow the textbooks. At the same time, the cultivation of students' comprehensive literacy is not ideal, and the core literacy system becomes an accessory and a "label" to deal with the inspection.

Therefore, future research should strengthen the specific research on how teachers can reasonably use mathematics textbooks to cultivate students' core literacy. These studies should investigate, reflect on and summarize the problems from the practice of teaching process. And the purpose of this studies are to improve the blank of how teachers use mathematics textbooks reasonably to promote the cultivation of students' core quality and to provide help for the front-line educators.

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