International Journal of Multidisciplinary Education and Research
ISSN: 2455-4588; Impact Factor: RJIF 5.12
Received: 22-01-2019; Accepted: 25-02-2019
www.educationjournal.in
Volume 4; Issue 2; March 2019; Page No. 22-24

A summary of the research on the implementation of core literacy in mathematics textbooks of senior high school

Runjie Miao[1], Zezhong Yang[2*]
[1, 2] The School of Mathematics and Statistics, Shandong Normal University, Jinan, Shandong, China

Abstract
The high school mathematics textbook is the important textual foundation to study the high school mathematics, and the task of implementing the core literacy of the students cannot be separated from the textbooks. In order to further promote the research on the implementation of core literacy in high school mathematics textbooks, this paper reviewed the research on the compilation of textbooks. It stated that only the organic combination of education, science, reality, psychology and professionalism could make the compilation of mathematics textbooks meet the requirements of deepening the curriculum reform and implementing the fundamental tasks of taking high moral values establishment and people cultivation, and prepare for further research in the future.

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

1. Introduction
The core literacy of mathematics is a concentrated expression of the goals of mathematics curriculum and a comprehensive reflection of the quality of thinking, key abilities, and emotions, attitudes and values with the basic characteristics of mathematics. It is gradually formed and developed in the process of mathematics learning and application (Ministry of Education of P.R. China, 2017) [1]. At present, a series of related academic research has appeared in our country on how to understand the core literacy of mathematics and how to implement the core literacy of mathematics. Undoubtedly, these academic studies have greatly promoted the practice of core literacy in teaching. In order to further enrich the implementation of core literacy in the study of mathematics textbooks, this paper took a new round of curriculum reform standards and textbook revision as an opportunity, combined with the mathematics curriculum content to understand the core literacy system and its connotation, and conducted a research review from the aspect of textbook compilation, which paved the way for the follow-up research.

2. Implementing the Core Literacy in the Compilation of Mathematics Textbooks
2.1 The Compilation of Textbooks Reflects the Education
Li Xiaohua and Li Hongyan believed that before compiling the textbooks, we should take the cultivation of students' core literacy as the primary goal, and give full play to the role of comprehensive elements based on mathematical knowledge (Li, X.H., 2018; Lang, H.Y., 2018) [2, 5]. Yin Haiqiang also believed that education was an important principle in the compilation of textbooks, and it was necessary to put the development of students' core literacy into practice (Yin, H. Q., 2017) [7].
Zhang Jianyue, Li Hongyan and Zhu Xiaojuan believed that the design of textbooks should emphasize the target orientation of core literacy, the carrier role of mathematical knowledge, the selection of learning materials, the design of students' mathematical activities, the application of information technology and other elements; while the goals of textbooks should emphasize the acquisition of mathematical knowledge, the proficiency of mathematical skills, the improvement of mathematical ability, the formation of correct value judgment and positive psychological orientation, etc (Zhang, J.Y., 2016; Li, H.Y., 2018; Zhu, X.J.,2017) [3, 5, 10].
Zhang Jianyue believed that in order to implement the core literacy, we should compile textbooks on the basis of a thorough understanding of "the index system of core literacy of senior high school students" and the connotation of the core literacy of mathematics given by the curriculum standards, closely combining the essence and core content of mathematics disciplines. In this way, we could deeply interpret the core literacy system of senior high school students, compile the "two-way detailed list of the performance level of core literacy indicators of senior high school students" and give the detailed list of core literacy corresponding to the content of textbook units (chapters) (Zhang, J.Y., 2016) [3]. Le Xiaomei also believed that we should deeply interpret the core literacy according to the content of mathematics teaching, and compile the "two-way detailed list of core literacy in mathematics discipline". In the process of compiling high school mathematics textbooks, we should interpret the core literacy of mathematics based on the curriculum standards, sort out the structure of mathematics textbooks, and then give the core literacy training objectives of the corresponding textbook chapters and units (Le, X.M., 2017) [6]. Shi Ou and Zhang Wen also believed that the " two-way detailed list" played an important role in the process of implementing core literacy (Shi, O. & Zhang, W, 2016) [9]. Zhou Yuanfang and Feng Dingying believed that in the course of compiling textbooks, we should compile matching training systems such as exercises, draw up corresponding "two-way multi-dimensional detail tables", and divide them into multiple dimensions to illustrate the degree of achievement of various training indicators and the degree of implementation of core literacy (Zhou, Y.F. & Feng, D.Y., 2016) [12].

Zhang Jianyue believed that on the basis of clarifying the focus of developing students' core literacy in each chapter, we should also give a clear indication of how to implement the core literacy in mathematics teaching, and provide operational guidelines for the implementation of core literacy, which were developed in parallel with the revision of curriculum standards and compilation of textbooks (Zhang, J.Y., 2016) [3].

2.2 The Compilation of Textbooks Reflects the Science

Li Xiaohua, Zhang Jianyue, Li Hongyan, Yin Haiqiang, Gao Min and Zhu Xiaojuan believed that the logical coherence of the structure system of mathematics textbooks had a fundamental influence on the implementation of core literacy. At the same time, they also believed that the textbooks should be compiled to ensure the accuracy of the content expression, which was the bottom line of textbook preparation. (Li, X.H, 2018; Zhang, J.Y., 2016; Li, H.Y.,2018; Yin, H.Q.,2017; Gao, M.,2018; Zhu, X.J.,2017) [2, 3, 5, 7, 8, 10].

Zhang Jianyue believed that it was necessary to establish a standardized system for research, compilation, and experimentation of textbooks to verify whether the textbooks were "profitable and educated", whether the core literacy of students was developed after learning the textbooks, whether teachers understood the reform intentions of the textbooks, and whether the textbooks were consistent with the needs of social development (Zhang, J.Y., 2016) [3].

2.3 The Compilation of Textbooks Reflects the Reality

Li Hongyan believed that the implementation of core literacy must focus on the reality of textbooks (Li, H.Y., 2018) [5]. Zhang Jianyue also believed that the reform of textbooks must be integrated into the realistic materials reflecting the atmosphere of the times to create learning situations. Only these realistic materials which were consistent with the life experience of students can arouse students' interest in exploring, so as to cultivate students' core literacy (Zhang, J.Y., 2016) [3]. Yin Haiqiang also believed that in order to promote the development of students' core literacy, we must implement the advanced nature of the textbooks and keep pace with the times (Yin, H.Q., 2017) [7]. Li Xiuhong also believed that mathematics textbooks should be written to focus on the real life situation to arouse students' thinking and cultivate students' ability in all aspects. (Li, X.H., 2018) [11]. Cai Xiaoqing also believed that textbooks should be written to cater to the development trend of the times and integrate the elements of reality in order to induce students to improve their cognitive systems in relevant situations, develop a good learning attitude, and promote the cultivation of students' core literacy (Cai, X.Q., 2018) [4].

2.4 The Compilation of Textbooks Reflects the Psychology

Zhang Jianyue and Yin haiqiang believed that textbooks should be compiled to enhance the readability of textbooks, use the language that students could understand, avoid the tendency of adulthood, and express highly abstract mathematical content in a way that students could easily accept (Zhang, J.Y., 2016; Yin, H.Q., 2017) [2,5].

Zhang Jianyue believed that the compilation of textbooks should be well connect with the existing cognitive structure of students. At present, special attention should be paid to the connection between junior high school and senior high school, as well as the connection and reference between subjects (Zhang, J.Y., 2016) [3].

Zhang Jianyue believed that textbooks should be compiled to adapt the learning content and its order to the level of students' thinking development and cognitive experience (Zhang, J.Y., 2016) [3]. Le Xiaomei believed that textbooks should be compiled to pay attention to adaptability. The development of mathematical content should be gradual and spiral, which conforms to students' cognitive law (Le, X.M., 2017) [6]. Yin Haiqiang believed that textbooks should be compiled to suit the knowledge level of senior high school students and the students' needs for different knowledge abilities so as to promote students to build their own knowledge system, study independently and form their ability to deal with mathematics problems independently (Yin, H.Q., 2017) [7].

Zhang Jianyue, Li Hongyan and Le Xiaomei believed that when textbooks were compiled, we need to pay attention to individual differences and make them flexible. Different arrangements are made according to the compulsory and optional contents set by the curriculum standards, so that different students and different regions had the opportunity to choose (Zhang, J.Y., 2016; Li, H.Y., 2018; Le,X.M., 2017) [3, 5, 6]. Li Xiaohua, Shi Ou and Zhu Xiaojuan also believed that the textbooks should be written in an open manner, so as to meet the needs of students with different abilities and fulfill the task of developing students' core literacy (Li, X.H., 2018; Shi, O., 2016; Zhu,X.J., 2017) [2, 9,10].

2.5 Professionalism of Textbook Writing Team

Zhang Jianyue believed that textbook compilers should reach a high level in the three aspects of "understanding mathematics, understanding students and understanding teaching", so as to master the basic rules of textbook compilation and compile high-quality textbooks (Zhang, J.Y., 2016) [3]. Li Xiaohua, Le Xiaomei and Yin Haiqiang also believed that the mathematical knowledge level and core literacy of the textbook writing team should be constantly improved, so as to strengthen the stability of the writing team and ensure the quality of textbook writing (Li, X.H., 2018; Le, X.M., 2017; Yin, H.Q., 2017) [2, 6, 7]. Zhu Xiaojuan also believed that a high-level textbook writing team was absolutely necessary for the implementation of core literacy (Zhu, X.J., 2017) [10].

3. Comment on Current Studies

In summary, we can see that the current research on the implementation of core literacy in mathematics textbooks mainly focuses on compiling mathematics textbooks combining with core literacy. As for the compilation of mathematics textbooks, the methodological level of research by various researchers is more scientific and specific, which not only meets the requirements of the new curriculum reform, but also takes into account the needs of students' psychological development and social development. And these studies become the key to improve the quality of textbook compilation and implement core literacy. None of these methods is unreasonable.

However, from the above analysis, we can also see that the specific operation of compiling mathematics textbooks combined with core literacy is not deep enough. 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 under the academic form, which is relatively abstract. In compiling textbooks, how to transform core literacy from academic form to practical operation level can make it more specific and operable, so that it can be better implemented in practical teaching, which will need to be further improved. Although this problem has been recognized and mentioned by some researchers, few people have conducted in-depth research from this point of view, which leads to the fact that most front-line teachers can not well implement the task of cultivating students' core literacy in textbooks. The core literacy system becomes an accessory and a "label" to be checked.

Therefore, future research should strengthen the specific research of compiling mathematics textbooks around core literacy. These studies should investigate, reflect on and summarize the problems in the compilation of textbooks and teaching practice, so as to transform the theoretical guidance into concrete practice, which will make the task of implementing core literacy more specific and operable, and will improve the teaching and promote the cultivation of students' core literacy.

Funding

This research was financially supported by the Shandong provincial education department (Grant No. SDYY17127) and the Shandong normal university (Grant No. 2016JG29 and No. SYJG040234).

4. References

1. Ministry of Education of the People's Republic of China. Mathematics Curriculum Standards for Senior High Schools (Experimental). Beijing: People's Education Press, 2017.
2. Li XH. Reflections on the Implementation of Core Literacy in High School Mathematics Textbooks. Famous Teacher Online. 2018; 24:44-45.
3. Zhang JY. Reflections on the Implementation of Core Literacy in High School Mathematics Textbooks. Course. Textbooks. Teaching methods. 2016; 36(07):44-49.
4. Cai XQ. Multiple perspective cultivation, waiting for the core literacy bloom ― Reflections on the Implementation of Core Literacy in High School Mathematics Classroom Teaching. Course Education Research. 2018; 38:129-130.
5. Li HY. Reflections on the Implementation of Core Literacy in High School Mathematics Textbooks. Mathematics Learning and Research. 2018; 14:104.
6. Le XM. Reflections on the Implementation of Core Literacy in High School Mathematics Textbooks. Examination Weekly. 2017(A1).
7. Yin HQ. Some Thoughts on Implementing Students' Core Mathematics Literacy in School-based Textbooks of High School Mathematics. Mathematics Learning and Research. 2017; 7:98.
8. Gao M, Liao XY. Analysis Strategies of High School Mathematics Textbooks from the Perspective of Mathematics Core Literacy―Taking "Induction Formula of Trigonometric Function of PEP as an Example. Course Education Research. 2018; 27:141.
9. Shi O, Zhang W. The Cultivation of Students' Core Literacy Calls for Textbooks Based on Core Literacy. Course Textbook Teaching Method. 2016; 9:14-19.
10. Zhu XJ. On the Strategies of Implementing Core Literacy in Senior High School Mathematics Textbooks. College Entrance Examination. 2017; 27:88-89.
11. Li XH. Several Research on Implementing Core Literacy in High School Mathematics Textbooks. Research on the Development of Teachers' Teaching Ability. 2018; 17:4.
12. Zhou YF, Feng DY. Optimizing the Training System of Textbook and Implementing the Core Mathematical Literacy ― Taking the "Sequence" Unit of the Revised Senior High School Mathematics Textbook A Edition as an Example. Mathematics Education in China. 2018(22)3:10-22.