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Application of textbooks to cultivate students' intuitive imagination literacy

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Abstract
With the development of high school mathematics teaching reform, effectively cultivating students' intuitive imagination literacy has become one of the core contents of high school mathematics teaching. Based on the analysis of intuitive imagination literacy and the characteristics of the currently used teaching materials, this paper suggests that teachers should use the content of textbooks to create an intuitive teaching situation in the teaching process, arrange the content of the textbooks in combination with the critical period of the development of students' intuitive imagination, and explore the dual characteristics in the number and shape of knowledge points in the textbooks.

Keywords: mathematics textbook, intuitive imagination literacy, mathematics teaching

1. Introduction
With the continuous advancement of curriculum reform and the concept of "core literacy system" proposed, how to cultivate students' core literacy in practical teaching has become a concern of teachers (Huang, Z. M., 2018) [1]. Research on how to cultivate intuitive imagination literacy is endless, but little research has focused on how teachers should use textbooks to cultivate intuitive imagination literacy. Mathematical textbooks provide learning themes, basic clues and specific content for the "teaching" and "learning" activities. They are important teaching resources for realizing the goals of mathematics curriculum and developing the core literacy of students' mathematics disciplines (Ministry of Education of P.R. China, 2017) [2]. Gao Min, Wang Ruixia clearly pointed out that the overall structure of subject knowledge displayed in textbooks can help teachers grasp the internal relationship of relevant knowledge, understand the status of each knowledge point in the textbook. Therefore, the key points and difficulties of teaching are clarified, the effectiveness of teaching is improved, and the teaching objectives are better realized (Gao, M., & Liao, X.Y., 2018; Wang, R.X., & Deng, C.,2017) [3, 4]. Zeng Tianshan proposed that textbooks are the most direct embodiment of teaching objectives, and the main basis for teachers' teaching work. They provide favorable conditions for teachers to adopt a variety of teaching strategies, and also provide convenient conditions for students to self-study. (Zeng, T. S., 1995) [5].
So how should teachers use textbooks to develop students' intuitive imagination literacy? What issues should be paid attention to in the process of using the textbooks to implement the literacy? These issues are worth studying. Only by conducting in-depth research on these issues can the teaching materials function better, and can guide the teachers to master more effective ways to cultivate intuitive imagination literacy, improve the level of students' intuitive imagination, and promote the core literacy system more scientifically.

2. Intuitive imagination literacy analysis
The "Standards for General Senior High School Mathematics Curriculum" proposes to develop six core literacy of mathematical abstraction, mathematical operation, mathematical modeling, visual imagination, data analysis and logical reasoning. Among them, intuitive imagination is a literacy that uses geometric intuition and spatial imagination to perceive the shape and change of things, uses spatial forms, especially graphics, to understand and solve mathematical problems (Ministry of Education of P.R. China, 2017) [2]. It can be seen from the definition that the intuitive imagination literacy emphasizes the understanding of the positional relationship, morphological changes and movement laws of things in the real world through spatial forms, and establishes the connection between form and number. Therefore, the implementation of intuitive imagination core literacy in mathematics teaching can create a bond between the real world and mathematics for students (Wu, L. B., & Liu, Z.Y., & Kang, W., 2018; Fang, H.L., & Luo, C., 2016) [6, 7]. Students can enhance the ability to combine numbers and shapes, enhance the awareness of using geometric vision and spatial imagination to think about problems; and use visual imagination to establish connections between mathematics and other disciplines and form a theoretical system (Wu, L.B., & Wang, G.M., 2017) [8]. Therefore, it is of great significance and value to implement the core literacy of intuitive imagination in high school mathematics teaching.

3. How to implement intuitive imagination by means of teaching materials
3.1 Using the teaching materials to create an intuitive teaching situation
When it comes to implementing intuitive imagination in mathematics teaching, most teachers first think of using visual aids in the teaching process, but few teachers use textbooks as an option for visual aids in the classroom, which leads to many of the visual material in the textbook

not being fully developed and mined (Chen, H.R., 2019; Huang, Z.M., 2018) [9, 10]. Teachers should realize that textbooks are not just a booklet containing knowledge narratives and exercises, but one of the powerful tools for implementing intuitive imagination.

The high school mathematics textbooks currently used not only have text narratives, but also a large number of pictures for guidance and explanation, and this is the material that teachers can make full use of to construct an intuitive teaching situation.

Teachers should fully explore and extend the pictures in the textbooks to understand what knowledge can be introduced and what abstract knowledge becomes more intuitive with this image. These behaviors of teachers can make the relevant knowledge content and the familiar life of students have an intuitive connection at the beginning, which not only helps the formation of the student's knowledge system, but also enriches the students' intuitive imagination and lays the foundation for the study of this part of the content.

Take the PEP textbook as an example, in the function concept section, the textbook gives an example of the launching projectile and is accompanied by a picture. The picture gives the students a visual representation of the scene of the projectile launch, and retains the trajectory of the projectile, making it easy for students to understand the actual situation of the height of the projectile from the ground over time. This form is more intuitive than text or lists. Based on this, teachers can provide students with an intuitive situation, allowing students to construct mathematical knowledge based on intuitive imagination.

3.2 Arrange textbook content according to the critical period of student development

Many scholars' research shows that the development of visual imagination of middle school students is from the initial imagination of basic geometric figures to the deep imagination of planar geometric figures, and then to the progressive imagination of the deep imagination of three-dimensional basic geometric figures. There is also a clear critical period in this development process. (Shen, J.X., & Wang, F.P., 2017; Lin, C.D., & Wu, J.Z., & Chen, H.Z., 2003) [11 ,12]. In the middle school stage, the second, third and first year of high school are the key periods for the development of geometric and visual imagination. Therefore, the cultivation of intuitive imagination needs to pay attention to the critical period of mathematics teaching. Grasping the "recent development zone" of students' learning and the key period of growth will undoubtedly have a multiplier effect on the cultivation of students' intuitive imagination.

Take the PEP textbook as an example, the three-dimensional geometric content is arranged in "Compulsory 2", which is the content for the first-year students; the application involving the space vector is arranged in "Elective 2-1", which is learned by the second-year students.

The first grade is the key period of three-dimensional geometry learning, and the second grade is the maturity period. Therefore, the arrangement of the textbooks is in line with the law of students' intuitive imagination.

It is best not to adjust the content of the textbooks greatly when the teacher is teaching, but on the basis of fully understanding the level of the students, the order of teaching within each chapter can be reasonably arranged. According to the level of curriculum standards, the way to present teaching content from low to high in three levels of intuitive imagination is most easily accepted by students.After solving the low-level problems, the students have mastered the methods and increased their self-confidence, and naturally improve the level step by step. The students will gradually get better and achieve the ultimate goal of implementing intuitive imagination.

3.3 Mining the dual characteristics of the number and shape of knowledge

The current textbooks are paying more and more attention to the dual characteristics of numbers and shapes about concepts, formulas, and theorems. But for many knowledge, the textbook does not have an in-depth analysis of its geometric meaning (Shen, J. X., & Wang, H., 2018) [13]. This requires teachers to pay attention to the geometric meaning of knowledge in the teaching process, using intuitive graphics to help students deepen their understanding of mathematical conclusions. In the secondary development process of textbook knowledge, teachers should not only give background material analysis of relevant knowledge, but also draw relevant graphics as much as possible, and explain the ideas according to the graph to avoid pure formal derivation. Teachers should let students express the intuitive feelings of mathematical conclusions in natural language, guide students to use natural language to express the discovery and formation process of mathematical conclusions, and form a correct understanding of mathematical conclusions.

Take the PEP textbook as an example, in the teaching of the basic inequality of Compulsory 5, inquiry activity is arranged in the textbook which is to visually reflect the quantitative relationship between the geometric mean and the arithmetic mean of a, b by means of a semicircular model. Many teachers will pay attention to the quantitative relationship of several inequalities when preparing lessons, but a few teachers will think of guiding students to use graphics to prove. Therefore, teachers need to improve the knowledge points that appear on the textbooks to expand, and develop the dual characteristics of the number and shape of knowledge points.

Therefore, teachers need to supplement the knowledge points of textbooks and develop the dual characteristics of numbers and shapes of knowledge points. Only in this way can students be able to develop the ability to use graphics to describe problem-solving and achieve a higher level of intuitive imagination.

4. Conclusion

Textbooks are the most important material for teachers' teaching and students' learning. Therefore, it is meaningful to use textbooks to better implement intuitive imagination. Teachers can't limit the implementation of visual imagination to textbooks, but they can't be separated from the textbooks. Teachers can carry out more in-depth development of the content of the textbook from various angles, and make innovative use of the textbook, so that it can play a greater role in the teaching of students' intuitive imagination.

5. References

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