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The Importance of Mathematic History Education

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Abstract. The most fundamental way to comprehend mathematics is through its history. It is becoming more widely acknowledged that studying and teaching mathematics history has important epistemological implications. However, learning about the history of mathematics is also a good way to get a liberal education. This paper, through a method of literature review, introduces the functions of mathematics history education and provides several suggestions for mathematics history education.

Keywords: mathematics, mathematics history, education, new humanism.

1. Introduction

The most fundamental way to comprehend mathematics is through its history. The renowned math historian M. Klein believed that learning about the history of mathematics was an excellent way to begin studying mathematics [1]. The famous mathematician of the 20th century, Pangal, believed that studying mathematics was the most suitable approach to forecast the future of mathematics [2]. It is becoming more widely acknowledged that studying and teaching mathematics history has important epistemological implications. However, learning about the history of mathematics is also a good way to get a liberal education. The New Humanist, a well-known scientific historian History is a tool, and studying the history of science is an effective method of educating for humanization [2]. According to George Sutton, a renowned historian of science and a key player in the New Humanism, the history of mathematics is provided at many institutions in this dual sense: as an optional subject for mathematics majors or as a free general education option. What special humanistic value does mathematics offer? How might the history of mathematics and mathematics education be more effectively integrated? These are the first questions to ask.

Because of the special nature of the object of study in the history of mathematics, its educational function is multi-faceted. The famous Chinese mathematician Wu Wenjun said, "If you have clarified the historical development of mathematics, the occurrence and development of a field, the prosperity and decline of a theory, the origin of a concept, the emergence and influence of an important idea, and many other historical factors, then you will understand much more about mathematics [3]." The current state of mathematics will be known more clearly and deeply, and it will also serve as a kind of guide to the future of mathematics [3]. To a large extent, it can be said that it is impossible to fully understand mathematics as a science without understanding the history of mathematics. We know that the content of higher mathematics is very abstract and highly ideological, logical, and deductive. If students only know what they know but do not know why they know it, they will often fall into a situation of rote

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memorization. At the same time, due to the lack of understanding of the history of mathematics, many undergraduates and even postgraduates do not know the history of mathematics [4].

Many undergraduates and even postgraduates have little knowledge of the historical origins and cutting-edge advances in mathematics and cannot even properly evaluate the historical merits and great achievements of traditional Chinese mathematics, thus making it difficult to stimulate their interest in learning. This paper focuses on its educational importance from the nature of mathematical knowledge, the development of students' thinking skills, mathematical research skills, and the overall cultural quality of students. Besides, the paper will provide several suggestions for mathematics history education. It is hoped that the paper will provide some interesting perspectives on this topic.

2. Functions of mathematics history education

2.1. Helping students to understand the nature of mathematical knowledge

The essence of mathematical knowledge is mainly reflected in "mathematical ideas" and "mathematical methods", and the history of mathematics shows that the transmission of mathematical achievements is mainly the transmission of mathematical ideas and methods. Therefore, in the process of learning mathematical knowledge, we can only understand the real background of mathematicians' mathematical research, the methods of mathematicians' work, and the ways of mathematicians' thinking so that we can see the essence through the phenomenon, get more enlightening and applied conclusions, and can draw nutrients from them to stimulate the spark of new ideas. Taking the contribution of the German mathematician Galois to abstract algebra as an example, abstract algebra is mainly concerned with the structure of algebra, of which the most fundamental are groups, rings, and domains, and group theory plays a particularly prominent role in abstract algebra [4].

Galois introduced the earliest notion of "group" in history when he solved the problem of whether the roots of general equations of the fifth and higher degree are radially solvable [4]. Before Galois, Lagrange had already discussed the substitution of roots of equations and realised that substitution theory was "the true philosophy of the whole problem", but he failed to move on [4]. It was only through the introduction of the new concept of "group" that Galois made the substantive connection clear. His work can be seen as the beginning of abstract algebra, not only because he solved the difficult problem of solvability of the roots of equations, but more importantly because the introduction of the concept of "group" led to a profound change in the object, content, and method of algebra, thus allowing us to better understand the essence of what has been said since the 4th century [5]. The introduction of the concept of "group" led to a profound change in the objects, content, and methods of algebra, thus enabling us to better understand the structure of algebra as it has developed since the 4th century. It is only by understanding the nature of mathematical knowledge that the fundamental directions of mathematical development and the links with other areas of science can be revealed.

2.2. Contributing to the development of students' thinking skills

Mathematics has always been regarded as an effective subject for mind training, and the history of mathematics provides a wealth of rich and powerful material to support this function. It is well documented that mathematical methods have a powerful role to play in our understanding of the world. It shows the enormous significance of abstract thinking in solving scientific and practical problems, revealing the process of scientific understanding and the development of scientific theories [6]. It reveals the processes by which scientific understanding is formed and the ways in which scientific theories emerge and develop. It was in the process of studying the history of mathematics that Wu Wenjun was inspired to take a unique approach and realise the dream of mechanical proof of geometric theorems that had been held for centuries. He said: "The mechanisation of proofs of geometric theorems, from thought to method, has been in existence since at least the Song and Yuan dynasties. Although these are extremely primitive, they are, in my case, largely inspired by ancient Chinese mathematics [6].

Throughout the history of mathematics and its various branches, there have been periods of significant transitions. Focusing on the turning periods in the history of mathematical development and

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the selective introduction of breakthroughs can help stimulate students' creative thinking. For example, introducing milestones in the history of mathematics such as the discovery of irrational quantities, the emergence of analytic geometry, the introduction of calculus, the discovery of non-Euclidean geometry, and the creation of the electronic computer is beneficial to enhancing students' mathematical thinking [7]. At the same time, the path of scientific development is not an easy one. Mathematicians often used their mathematical intuition to make conjectures, and then they reached their conclusions only after painstaking and tortuous reasoning. Mathematical textbooks, on the other hand, reverse the process of expression and actual creation, following the Theorems-Axioms-Theorems-Examples [7]. In contrast, the history of mathematics provides a clear picture of the creative thinking of mathematicians. The history of mathematics is a true historical record of the creative thinking of mathematicians, which is the best material for developing students' thinking skills.

2.3. Conducive to the development of students' mathematical research skills

The formation of mathematical concepts and the establishment of mathematical theories cannot be achieved without certain research methods. If the method is correct, no or less detours can be taken, otherwise half the effort will be made and it will be a waste of time. Mathematicians have developed a series of scientific research methods in their long history of mathematical activities. We should introduce students to the thinking habits and research methods of some famous mathematicians in history and analyse their successes and failures so that students can learn from and be inspired by them, thereby enhancing their methodological awareness and developing their scientific research skills. The history of mathematics is rich in typical examples of research methods, such as: Liu Hui, a mathematician in the Wei and Jin dynasties, used the principle of "complementarity of difference" to ingeniously prove the Pythagorean theorem [8]; the establishment of Euclid's geometric system was not only a successful use of formal logic, but also created the far-reaching axiomatic method; Descartes Newton argued that scientific research should be free of unsubstantiated hypotheses, and so on [8]. There are many such examples, from which students learn not only about the history of mathematics but, more importantly, the importance of mathematical research methods, which will serve as an important guide for their future studies and work.

2.4. Helping to improve the overall cultural quality of students

With the increasing pace of information technology and high-tech development in society, a knowledge-based economy is beginning to emerge and, accordingly, education has entered a new stage of development [8]. The competition in the new century is the competition of talents, and the level of talents depends to a large extent on their comprehensive cultural quality. This requires the penetration of the arts and sciences and the intersection and compatibility of multiple disciplines. This requires the penetration of the arts and sciences, the intersection and compatibility of multiple disciplines, and the history of mathematics serves as a good bridge.

Firstly, the history of mathematics is a comprehensive subject involving many branches of mathematics and is essentially a historical science. It is a comprehensive subject that involves many branches of mathematics and is essentially a historical science. It is a comprehensive discipline covering many branches of mathematics and is essentially a historical science. It covers the natural sciences, human thought, social astronomy, geography and economics, philosophy and politics, literature and art, religious practices, and even law and the military. The history of mathematics is a major part of the development of mathematical concepts and theories. If we talk about mankind's understanding of the shape and size of the earth, it is inevitable that we will have to deal with the shape and size of the earth. It is inevitable that Aristotle's arguments and the first great progress in the concept of space and Eratosthenes' quantitative calculations [8]. Furthermore, the history of mathematics combines the truth-seeking of mathematics education with the beauty-seeking of humanities education and significantly enhances students' spirituality. For example, formulas are examples of the intrinsic beauty of mathematics.

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The symbols of the constants in modern mathematics have been divinely combined by Euler. For example, in the Wei and Jin dynasties, Liu Hui conceived the Mouhe square cover for the volume of the ball, and in the Southern Song dynasty, Yang Hui wrote the "Continued Ancient Picking Qi Algorithm" to expand the three-step vertical and horizontal diagram to ten steps [9]. The longitudinal and transversal diagrams, etc., show the beauty of the outer levels of classical mathematics in China. The development of mathematics is also very closely related to philosophy. In both ancient and modern times, many mathematicians were also great philosophers, such as the ancient Greek mathematician Plato and the modern mathematician Russell. Through the study of the history of mathematics, students can receive a profound philosophical education. Based on the above understanding, all mathematics departments in universities should be a compulsory subject in the mathematics departments of teacher training colleges [9].

3. Suggestions for mathematics history education

3.1. Choosing appropriate textbooks and having teachers specialising in the history of mathematics

The old generation of historians of mathematics in China, such as Li Yan and Qian Baocheng, always attached importance to teaching the history of mathematics. They have written a large number of textbooks on the history of mathematics. Many works on the history of mathematics have also been published abroad. For example, "Mathematical Thought in the Past and Present" by the American mathematician Maurice Klein is a very good work on the history of mathematics [8]. These books are written either chronologically or along disciplinary lines. They are also written in a comprehensive manner. Most of these textbooks provide us with a wealth of information on the study of the history of mathematics in China and abroad. Most of these textbooks provide us with a wealth of content and results from both domestic and international research in the history of mathematics. The question is how to translate this rich content into an educational form in order to achieve its proper educational function. The author believes that for mathematics students in teacher training colleges, the teaching of the history of mathematics should be based on broadening their horizons and enhancing their knowledge. The history of mathematics should be taught in a way that broadens the horizons, enhances the quality, and cultivates the temperament of the students. The content of primary mathematics should be given more space, especially the study of thematic histories of mathematics. For example, topics such as "The Problem of the Third Division of an Angle" and "The History of Mathematical Symbols" will provide students with a good foundation for their future teaching of secondary mathematics [9].

For students of mathematics at comprehensive universities, the history of mathematics should be taught with a focus on learning and learning from the past. The teaching of the history of mathematics should focus on learning and imitating the specific ways of thinking that the great mathematicians of history have used to formulate and solve problems, in order to inspire them to learn and apply. The History of Mathematics Teachers who teach the history of mathematics must have a high level of knowledge and experience in the history of mathematics, such as teachers specializing in the history of mathematics or teachers with a high level of expertise in mathematics, and teachers who have an interest in and have studied the history of mathematics [10].

3.2. Teaching the mathematics history according to the students' knowledge of mathematics in depth

To explain the history of mathematics is simply to compare the same mathematical concepts in ancient and modern times, to identify the differences between them, to show the process of mathematical development, and to inspire students to think about mathematics [9]. For example, "function" is a basic mathematical concept in different subjects in secondary schools and universities and has different definitions. To explain the problem, we need to understand the historical perspective of the concept of "function" in the process of change, so that students understand the meaning of "function" [10]. Most of the mathematical knowledge we teach at university now appeared many years ago, and there are significant differences between ancient and modern mathematical concepts in terms of presentation and

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approach. When teaching, it is important to delve into the context of the time, to appreciate the background in which mathematical theories arose, the notation used, the methods employed, etc.

To show students the latest achievements in the discipline, it is necessary to represent the work of cutting-edge mathematicians with imaginative metaphors and vivid examples so that students can understand modern mathematics.

3.3. Paying attention to the promotion of the spirit of mathematics

The teaching of the history of mathematics should not only include the teaching of specific historical mathematics materials but also the propagation of the spirit of mathematics. The spirit of mathematics is the spirit of enquiry. Teaching should pay attention to the introduction of the whole range of mathematical achievements and their background, so that students can understand the journey of exploring mathematical ideas and establish a correct scientific outlook and methodology [11]. For example, mathematics is consistently regarded as a rigorous and refined science, and students never doubt that there are problems with what they have learned, but the rigour of mathematics has been built up gradually, and there are still problems in consolidating the foundations of mathematics and exploring its meaning [11]. Making students aware of these is of great benefit in inspiring thought and fostering innovation. Furthermore, the teaching should promote the mathematicians themselves who created mathematics and infect students with their pursuit of mathematical truth, so that education in humanism can be implemented smoothly and naturally in teaching mathematics history.

4. Conclusion

The integration of the history of mathematics into the teaching of mathematics is an important means of quality education and a powerful measure in the reform of mathematics education. This is an important tool for quality education and a powerful initiative in the reform of mathematics education. This reform stimulates students' desire for knowledge and mobilizes their enthusiasm and creativity for learning. It helps students develop their thinking skills, their research skills, and their creative qualities. It is also a powerful tool in the reform of mathematics education. But in mathematics, the history of mathematics needs to be further explored in a more scientific and rational way.

As for the shortcomings of this paper, it lacks theoretical analysis and specific cases. It is hoped that relevant experimental research about mathematics education can be conducted in future studies.

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