

The path of cultivating college students' mathematical thinking ability in the new era

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Abstract: *Mathematical thinking is one of the important abilities that college students need to master in the process of learning mathematics learning. Strong mathematical thinking not only enables efficient problem-solving but also significantly enhances logical reasoning and creativity, fostering core mathematical literacy. Based on this, this paper will take the new era as the background, based on the basic connotation of college students' mathematical thinking ability, summarizes the value of college students' mathematical thinking ability, summarizes the college students' mathematical thinking ability, the specific college students' mathematical thinking ability cultivation path, in order to help students mathematical core literacy comprehensive development.*

Keywords: *new era; college students; mathematical thinking ability; cultivation path*

1. Introduction

Under the background of the new era, the sustainable development of social economy has put forward higher requirements for the quality and ability of talents. The traditional mathematics teaching mode has been unable to meet the actual needs of students' development and high-quality talent training. Therefore, it has become an inevitable trend to pay attention to the development needs of college students' mathematical thinking ability and to innovate the mathematics education system model comprehensively. Cultivating students' mathematical thinking ability can significantly improve the effectiveness of mathematics education, promote students' ability to think independently and solve problems independently, and then improve students' comprehensive ability level, and help students to realize the coordinated development of knowledge and skills. In view of this situation, in the educational practice, we must actively explore the innovative path of mathematics education mode, comprehensively improve the teaching effect, and promote the comprehensive improvement of students' comprehensive quality and ability through the construction of high-quality education mode.

2. The basic connotation of college students' mathematical thinking ability in the new era

In the new era, the mathematical thinking ability of college students refers to the product of the interaction between human brain and mathematics discipline, which goes beyond the category of simple knowledge and is one of the highest cognitive forms.^[1] The thinking ability of college students has the advantages of rigor and precision, abstraction and generalization, dynamic and development. Among them, rigor and accuracy are mainly reflected in the accurate definition of mathematical concepts and strict proof of mathematical theorem; abstract and generalization are reflected in the refining of mathematical concepts and the construction of mathematical theory; dynamic and development mainly refer to the development of college students' mathematical thinking ability is a dynamic changing process. During the development of thinking ability, students should constantly overcome their cognitive barriers and improve their mathematical thinking ability by participating in practical activities and exercises.

3. The value and significance of college students' mathematical thinking ability in the new era

3.1. Exercise students' logical thinking ability

In the process of cultivating college students' mathematical thinking ability, the solution of mathematical problems often requires students' ability to reason and prove the problems with the existing knowledge and experience and the ability to solve mathematical problems. Through continuously solving mathematical problems, analyzing problems, judging conditions, and solving and deriving problems, one

can gradually form a complete solution. In this process, students' thinking ability can become more and more rigorous, and their logical thinking ability can be significantly improved, which effectively exercises students' problem-solving ability.

3.2. Exercise students' abstract thinking ability

In the college stage, mathematical problems often have the characteristics of abstraction. Through the continuous transformation between specific problems and symbolic language, students need to extract and list the key information in the problem and find the essence of the problem. In this process, students' abstract thinking can be effectively exercised, and promote students' mathematical thinking ability to further improve.

3.3. Improve students' problem-solving ability

In the process of cultivating college students' mathematical thinking ability, students will have "close contact" with mathematical problems. However, the mathematical problems in colleges and universities are often not directly presenting the answers, but need students to effectively explore the answers through the comprehensive analysis of the problems and the flexible use of mathematical knowledge. Through the gradual solution of complex problems, students' thinking and ability to solve problems can be effectively cultivated, while strengthening students' mathematical thinking ability, it also lays a good foundation for students to enter the society in the future.

3.4. Improve students' innovative thinking ability

In the process of mathematical knowledge learning and mathematical problem solving, students often need to think about mathematical problems from different angles, and try to use innovative thinking and ways to solve mathematical problems. By cultivating students' mathematical thinking ability, students can solve problems independently more flexible use of mathematical knowledge, through the transfer of knowledge, put forward innovative problem solution, which realizes the effective cultivation of students' innovative thinking, for the future students in academic research and innovative entrepreneurship has important practical significance.

4. The dilemma of cultivating college students' mathematical thinking ability in the new era

4.1. Curriculum system level

At present, one of the main difficulties faced by the cultivation of mathematical thinking ability is the lack of perfection and scientificity of the curriculum system construction. At the level of curriculum system setting, colleges and universities pay too much attention to the explanation and teaching of theoretical knowledge, but ignore the important value of practical teaching, which leads to a serious imbalance between the proportion of theoretical courses and practical courses. In the setting of teaching content, there are also problems such as the untimely update of teaching content and the traditional rigidity of teaching content, which affect the broadening of students' cognitive scope, which hinders the development of students' mathematical thinking ability to some extent.

4.2. Teaching method level

Old teaching method is the main reason affecting the development of students' mathematical thinking ability. In the new era, the continuous deepening of higher education reform has brought more innovative and diversified teaching methods to colleges and universities, which makes the traditional teaching methods also show a certain inadaptability. But at present, the university teachers in the process of teaching practice, still follow the traditional education idea, using traditional give priority to with teachers' single indoctrination teaching way organize students to carry out related activities, although it has a certain teaching effect but the development of students' mathematical thinking ability by certain limitations, seriously affected the students' comprehensive quality ability.

4.3. Practical resource level

Whether practical resources are rich or not is related to the practical effect of cultivating college

students' mathematical thinking ability. At present, in the process of cultivating college students' mathematical thinking ability, colleges and universities pay too much attention to theoretical knowledge teaching, ignoring the important educational value of practical teaching, and practical resources show a state of lack. The lack of practical resources makes it difficult for students to carry out practical activities efficiently and with high quality, and it is difficult to improve the development of students' mathematical thinking ability in the practice process, which has certain obstacles to the development of students' mathematical literacy.

4.4. Evaluation mechanism level

Evaluation is a key link in the cultivation of the mathematical thinking ability of college students. However, due to the influence of traditional educational and teaching concepts, some teachers lack an objective understanding of the perfection of the evaluation system, and the evaluation standard has not been adjusted and optimized with the educational reform. In the process of evaluation, the lack of certain standardization and teachers' subjective factors have a significant influence on the evaluation results, and the evaluation method is too single, which makes the evaluation results lack objectivity and comprehensiveness. In addition, in the existing evaluation mechanism, the focus of evaluation is often placed on the mastery of students knowledge and skills while ignoring the evaluation of students' practical ability and mathematical thinking ability, which makes it difficult to bring the important value of evaluation into full play and hinders the development of students' comprehensive practical ability.

5. The path of cultivating college students' mathematical thinking ability in the new era

5.1. Restructure the curriculum system and strengthen the interdisciplinary integration of thinking orientation

The scientificity and rationality of the curriculum system directly affect the cultivation results of college students' mathematical thinking ability. During the educational practice process, colleges and universities should adhere to the principle of scientificity and rationality, optimize the reconstruction of the curriculum system, focus on strengthening the thinking element in the curriculum system, and try to integrate the curriculum system with other disciplines, practicing the interdisciplinary education concept, so as to promote the development of students' mathematical thinking ability within the perfect curriculum system. Specifically, in the teaching material change level, colleges and universities can organize teachers' independent preparation and students' mathematical thinking ability cultivation requirements of teaching material content, such as "Higher Mathematics", "Linear Algebra", "Probability Theory and Mathematical Statistics" and other teaching materials and teaching practice teaching case guidelines, the textbook focus on students' mathematical thinking ability development and innovative application ability development level, the cultivation of innovation consciousness and ability as the focus of the curriculum system. And try to integrate ideological and political, modern science and technology, engineering major related content and other subjects into the mathematics curriculum system, so as to realize the effective innovation of teaching materials. At the same time, in the process of curriculum system reconstruction, it is also necessary to pay attention to the coordination of the proportion between theoretical knowledge teaching and practical teaching, and appropriately increase the proportion of practical teaching, so as to ensure that students can have enough time for practical training in the learning process. At the level of teaching content, colleges and universities can combine the actual needs of students' mathematical thinking ability development.^[2]

Targeted design of the teaching content. For example, in the process of curriculum system reconstruction, a university tries to open the university physics course in the first semester of the first grade, in which vector algebra can be advanced to the first grade; increase the information of the sine series, cosine series and Fourier series in the infinite series. For the management of economics, add the knowledge of differential equations and the application of calculus in the economic field. It aims to improve the practicability of mathematics courses, strengthen the connection between professional courses and mathematics courses, so that students can gradually improve their mathematical thinking ability in the process of comprehensive knowledge learning.

5.2. Innovation of teaching methods, deepening the immersive learning enabled by science and technology

The optimization and innovation of teaching methods is an effective channel for cultivating college students' mathematical thinking ability. In the process of teaching practice, teachers need to pay attention to the innovation and optimization of traditional teaching methods. With the help of modern science and technology, they should comprehensively innovate teaching methods. By using technology, students can be provided with an immersive mathematics learning experience, thus improving students' mathematics learning outcomes and helping students' mathematical thinking ability to develop effectively. Specifically, in teaching practice, artificial intelligence technology can be introduced to the actual needs of students' mathematical thinking ability to create a high-quality mathematics classroom for students. In the process of utilizing artificial intelligence technology, artificial intelligence can be used to collect, organize and analyze the data and information related to students' mathematics learning and thinking ability development. On the basis of the data analysis results, it can formulate targeted development plans for learning and thinking ability for different students. For example, in order to promote the targeted improvement of students' mathematical thinking ability, a university builds a course knowledge map with the help of artificial intelligence technology, customizes personalized learning paths according to students' learning behaviors and preferences, and matches suitable learning resources and activities for students through the online AI recommendation system. With the support of artificial intelligence technology, students can make up for their mathematical learning deficiencies, and gradually improve their mathematical thinking ability such as abstract thinking and logical thinking.

Meanwhile, colleges and universities also need to pay attention to give full play to students' subjective initiative, with the help of artificial intelligence technology, to provide intelligent guidance and answer questions for students' study of mathematical knowledge. Through the flexible application of generative artificial intelligence technology, students can be assisted to carry out mathematics learning activities independently, so that students can constantly improve their mathematical thinking ability through independent support and technical learning. The AI tutoring system can answer students' questions in real time and provide timely and accurate answers and guidance. For example, in the teaching process of higher mathematics knowledge at a university, teachers try to use an artificial intelligence assistant to provide students with intelligent problem-solving idea guidance, knowledge-aided cognition, and one-to-one heuristic higher mathematics guidance and other services. This effectively alleviates the work pressure of mathematics teachers and also provides convenience for the development of students' mathematical thinking ability.

5.3. Expand the practice platform and develop the thinking training field combining virtual and reality

In the process of cultivating college students' mathematical thinking ability, the practical link plays a crucial role, which is the main way to transform theoretical knowledge into practical skills. Colleges and universities should pay attention to the educational advantages of practice and build a virtual and real thinking training environment so that students can gradually improve their thinking ability in practical activities. Specifically, colleges and universities should realize the importance of practical teaching in helping students transform theoretical knowledge into practice and provide students with a broader and more diversified practice space and opportunities to promote students' problem-solving and mathematical thinking abilities.^[3] Colleges and universities should encourage students to actively participate in various practical projects and cultivate students' data processing, evaluation, and innovative thinking ability through teamwork, data analysis, and other means. In addition, colleges and universities should strengthen cooperation and exchanges with enterprises and scientific research institutions, jointly establish practice bases inside and outside the school, and provide students with richer practice opportunities and a broader practice platform so that pupils can flexibly use the knowledge they have learned in practical work or scientific research projects and continuously enhance their mathematical thinking ability.

At the same time, universities can also consider introducing virtual reality technology to create a virtual practice platform for students. For instance, in the learning process of "the application of calculus in the economic field", virtual reality technology can be introduced to create practical scenes related to "the economic field" for students, and guide students to explore the application of calculus in the economic field. In this way, with the support of the virtual practice platform, students can connect their mathematical knowledge with their own professional knowledge, and further improve their knowledge transfer level and mathematical thinking ability.

5.4. Evaluation mechanism reform, constantly optimize the multidimensional dynamic assessment system

To improve the effectiveness of mathematics education, colleges and universities should pay attention to the help of students' mathematical thinking ability through scientific evaluation mechanisms. Specifically, colleges and universities should pay attention to the use of diversified evaluation methods, including self-evaluation by students, intelligent evaluation, and other diversified methods, and conduct a comprehensive evaluation of students' performance in class, homework completion, and the degree of participation in practical activities. At the same time, higher education institutions can also use modern information technology means to build a dynamic tracking system for the development of students' mathematical thinking ability, comprehensively collect relevant data and information in students' learning process, and accordingly generate a personal portrait of the development of students' mathematical thinking ability. By analyzing the actual development of students in aspects such as abstract thinking, logical thinking, and innovative thinking, and combining the evaluation results, teachers can accurately assess the comprehensive ability development of students. Accordingly, they can optimize the teaching plan in a targeted manner and make arrangements to improve the quality and effectiveness of mathematics education, thereby promoting the balanced development of students' quality and ability.^[4]

6. Conclusion

To sum up, the higher education institutions in the new era should actively change their educational ideas and continue to explore new ways to innovate the cultivation of college students' mathematical thinking ability. By refactoring the curriculum system to strengthen the interdisciplinary thinking-oriented integration, immersive learning experiences can be facilitated by innovative teaching methods that integrate science and technology, expand the practice platform to develop virtual and reality-of-thinking training environments, reform the evaluation mechanism to continuously optimize the multidimensional dynamic assessment system, and create a comprehensive innovative digital education system. The optimization of the education system can significantly enhance the overall quality and abilities of college students.

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