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Analysis and Research on the Integration of Mathematical Culture into Course Ideological and Political Education Cases

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Abstract

This article starts with mathematical culture and combines classic stories such as Cao Chong's weighing of the elephant and Han Xin's divide of oil. Analyze the ideological and political elements embedded in mathematical culture and effectively integrate them into classroom teaching. So as to achieve a silent effect on moistening things and implement the fundamental task of cultivating virtue and talent. Finally, strategies for classroom teaching are provided to provide some ideas for the reform of ideological and political education in university courses.

Keywords

Mathematical culture, Course ideological and political education, Cultivate virtue and cultivate talents

1. Introduction

When it comes to mathematics many people believe that it is both difficult and boring, consisting of numbers and a long string of symbols. More people consider mathematics as a tool. But in the long river of cultural history the existence of mathematics cannot be erased. Li Bai's "Lone sail, distant shadow, blue sky is exhausted, only the Yangtze River's skyline flow can be seen" well describes the characteristics of infinitesimal quantity. As the solitary sail moves forward, the visual effect on the fixed position becomes smaller and smaller. When the solitary sail approaches infinity, the visual effect tends to be infinitesimal. Until it is almost invisible, that is, only the Yangtze River skyline flow can be seen which reflects the idea of infinitesimal from a mathematical perspective. In Du Fu's "Jue Ju", "Two orioles chirp in the green willows and a row of egrets soar into the blue sky. The window contains the snow of the Western Ridge for a thousand autumns and the door berths the ship of the Eastern Wu for thousands of miles." This also contains mathematical elements, and the poet finely depicts the beautiful scene of spring from different perspectives of points, lines and surfaces.

2. Design and Analysis of Cases Ideological and Political Education

Nowadays, college students are a new generation who have grown up in the era of online information and will face many confusions and temptations. At the same time, the university stage is also a crucial period for the formation of a person's values. Therefore, teachers cleverly design ideological and political cases in the teaching process, deeply explore educational resources, and integrate educational functions into the entire teaching process from knowledge transmission to value guidance.

Case 1: Cao Chong Weighing of the Elephant

Once, Sun Quan brought a giant elephant. Cao Cao wanted to know the weight of the elephant and asked his subordinates, but he couldn't even come up with a way to weigh it. Cao Chong said, "Put the elephant on the big boat, mark the area where the water surface reaches, and then let the boat load stones. When the water surface also reaches the mark position, weigh the total weight of these stones (almost equal to the weight of the elephant) to know." Cao Cao was very excited and immediately followed this method.

2.1 Solving Problems

When introducing the concept of definite integral in teaching, it is often introduced by "finding the area of a trapezoid with curved edges." However, the method of finding curved trapezoids has similarities with the method of Cao Chong's representation. The weight of elephants is not easy to weigh directly. The clever Cao Chong used the "equal replacement method" to convert "big" into "small", divide and conquer, and this problem was successfully solved. This is similar to the idea of "infinite subdivision and infinite summation" in definite integrals. In teaching, we guide students to think deeply about the concept of definite integrals.

2.2 Exploration of Ideological and Political Elements

The same goes for dealing with many complex problems in life. When we encounter problems that are difficult, we can first break them down into smaller parts; Start with simple and familiar questions and tackle them one by one. Finally, by integrating zeros, we can achieve a breakthrough from quantitative change to qualitative change. This is the qualitative change caused by quantitative change in dialectics.

Case 2: Han Xin Divide of Oil

One day, Han Xin was walking on the road and saw two people on the roadside worried about distributing fuel. Originally, they had a basket with a capacity of 10 pounds, which was filled with oil. There was also an empty jar and an empty gourd, which could hold 7 pounds and 3 pounds of oil respectively. The two of them wanted to divide 10 pounds of oil equally, each with 5 pounds, but the preparation work was not done well, and neither of them brought a scale. They could only pour it back and forth in three containers, feeling helpless. After hearing the whole story, Han Xin immediately said, "Put the gourd in the jar and the basket, divide the oil and come home." So they quickly divided it up and happily finished dividing the oil and went home.

2.2.1 Solving Problems

Fill the gourd with oil, it weighs 3 pounds. Pour it into the jar until it is full, and repeat the process

again. In this way, there are 6 kilograms of oil in the jar; Fill the gourd with oil and continue pouring it into the jar. This time, fill the jar and there will be 2 kilograms of oil left in the gourd. Next, pour 7 kilograms of oil from the jar into the basket and then pour 2 kilograms of oil from the gourd into the jar. Finally, fill the gourd with 3 kilograms of oil and pour it into the jar, which will contain 5 kilograms of oil. This way, the jar and the basket each have 5 kilograms of oil.

2.2.2 Exploration of Ideological and Political Elements

Mathematics has infinite charm. By inserting small stories into the mathematics classroom, students can understand classic stories, cultivate national thinking patterns, and stimulate their interest in learning mathematics. While appreciating the beauty of mathematics, it can not only enhance children's cultural heritage, but also subtly nourish their national spirit.

Case 3: Han Xin Counting soldiers

At the end of the Qin Dynasty, there was a conflict between Chu and Han. Once, Han Xin engaged 1500 soldiers in battle with the Chu army, but the Chu army was defeated and retreated back to the camp. The Han army also suffered 400 to 500 casualties. Therefore, Han reorganized his troops and returned to the base camp. When we reached a mountain slope, suddenly a rear army came to report that Chu cavalry was chasing after us. Han's troops arrived at the top of the slope and saw that the enemy was less than five hundred cavalry, so he ordered troops to meet them. He ordered three soldiers to line up, but there were two more; Then he ordered five soldiers to line up, resulting in three more soldiers. He ordered seven soldiers to line up, resulting in two more. Han immediately announced to the soldiers: Our army has 1073 brave soldiers, and the enemy is less than 500. We stand at a high position and with a small number of troops, we can definitely defeat the enemy. So morale surged, and the Chu army suffered a great defeat and fled.

Ask questions: How did Han Xin quickly calculate the total number of soldiers in this team based solely on these data, and what is the secret behind it?

2.3 Solving Problems

If the total number of soldiers is m, the following equation system is satisfied:

$m = 3l_1 + 2$; $m = 5l_2 + 3$; $m = 7l_3 + 2$.

Theorem given by literature:

If the system of equations $\begin{cases} m = pt_1 + s \\ m = qt_2 + l \end{cases}$ has a solution, then the form of the solution:

$$m = \frac{pq}{(p,q)}k + \frac{pl(q+1)qs(p+1)}{p-q}$$

Therefore, standing together $\begin{cases} m = 3l_1 + 2 \\ m = 5l_2 + 3 \end{cases}$, obtaining $m = 15k - 7$, taking $k = 2$, that is

$m = 15k + 23$.

Once again united $\begin{cases} m = 7l_3 + 2 \\ m = 15k + 23 \end{cases}$, obtain $m = 105k - 292$, take $k = 3$, that is $m = 105k + 23$.

Because $1000 \le m \le 1100$, so take $k = 10$, $m = 1073$. This is completely consistent with the number of soldiers mentioned by Han Xin.

2.4 Exploration of Ideological and Political Elements

By introducing the story of "Han Xin Dianbing" in ancient mathematics, students can be inspired to think about using residues to calculate the total number. Secondly, it can allow students to feel the intelligence and wisdom of ancient Chinese people, thereby generating a sense of national pride. Stimulate students' patriotism and strong interest in mathematics.

3. Classroom Teaching Strategies

Students are the main body of the classroom, fully leveraging the role of "student-centered, teacher guided learning", so that every student can fully "move" and explore and learn new knowledge independently. Teachers should be good at throwing away problems and guiding students to think actively.

Firstly, in the classroom teaching process, introducing mathematical history, classic stories, and other methods can arouse students' interest and guide them to actively and consciously learn. While imparting mathematical ideas and methods, emphasis is placed on inspiring students to recognize the "ideological and political elements".

Secondly, using the introduced short story materials as the starting point, students can experience the joy of mathematics and feel the wisdom of the ancients by posing and solving problems. Cultivate students' patriotism and exploratory spirit.

Finally, by presenting facts and reasoning, students should be nurtured, while achieving an organic combination of explicit education and implicit education through a subtle and penetrating approach to ideological and political education. Leave a relevant political homework after class to allow students to summarize their ideological gains and personal reflections.

4. Epilogue

Many historical allusions contain the strategies and wisdom of ancient people in solving mathematical problems, which can help students understand the status of mathematics in the development of human civilization and stimulate their interest in learning mathematics. In the wave of ideological and political education in the curriculum, introducing interesting classic stories into the mathematics classroom can not only improve the classroom atmosphere, cultivate national thinking methods, but also inspire students to acquire more knowledge and skills from it, while firmly adhering to ideals and beliefs, forming a correct outlook on life and values.

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