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# Exploration of Ideological and Political Education in Probability Theory and Mathematical Statistics

Weijuan Shi, Zhijun Luo*

Department of Mathematics and Finance, Hunan University of Humanities, Science and Technology, Loudi, 417000, PR. China

**\*Corresponding author:** Zhijun Luo

| Abstract | Review Article |
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Probability theory and mathematical statistics is one of the important basic courses of department of mathematics and applied mathematics, department of information and computational science, etc. It is a mathematical discipline that studies and deals with random phenomena, it is an important part of modern mathematics. This course is high comprehensive. It is difficult for some students to comprehend because of their weak foundations, especially for the studying of multidimensional random variable distribution which is abstract. Many students lose interest and motivation. Summarizing and refining the ideological elements about the course and integrating it into the class can stimulate students' interest in extracurricular learning, help them understand the frontiers of probability theory and mathematical statistics, establish higher learning goals, improve ideological understanding, cultivate students' strong quality, and establish correct three views. At the same time, teachers' ideology and educational skills have been improved.

**Keywords:** Ideological and Political Education; Teaching Reform; Probability Theory and Mathematical Statistics.

## INTRODUCTION

### The meaning analysis of "Ideological and Political Education"

The chairman of Chinese, Xi Jinping, stressed that: "we should take full advantage of classroom teaching as the main channel, Make all kinds of courses with the direction of ideological and political theory and form a synergistic effect".

"Ideological and Political Education" is not to change the original attribute, nor to transform professional courses into ideological and political courses or treat all courses as ideological and political courses. Instead, it gives full play to the moral education function of the curriculum, applies the discipline thinking of moral education, extracts the cultural gene and value paradigm contained in the professional curriculum, transforms it into an effective teaching carrier which embodies the socialist core values vividly, and integrates the spiritual guidance of ideals and beliefs in the "moistening things silently" knowledge learning [1].

### "Ideological and Political Education" examples

The course of probability theory and mathematical statistics contains rich ideological and political elements. If it can enter into the classroom "moistens things silently", it will play a positive role in students' learning interest, patriotism, three views, scientific research awareness and other aspects. At the same time, teachers' ideological awareness and educational skills will be improved. Therefore, it is particularly important to summarize cases which contain ideological and political elements.

For example, in the first class, the introduction to probability theory and mathematical statistics, we can introduce professor Baolu Xu, The academician of Chinese Academy of Science Xiru Chen, we can guide students to learn xu's dedication to the motherland, the spirit of devotion to science. Chen was born in Wangcheng county, who is natural open-minded, be calm in adversity, remain unruffled, indifferent to fame and wealth, has made an important contribution to promote the application of mathematical statistics in our country, which inspiring students' the emotion of "Family-country".

When we talk about the principle of small probability events, we can give an example: There is an English test paper which include 10 choice questions, each question has 4 choice answers, and only one of

them is the correct answer. Some one is opportunistic, fill in a blank at will, What is the probability that he fill out at least 6? After calculation: the probability is 0.01973, or less than 2%. Conclusion: a random guess that gets six out of 10 questions right is a very unlikely event, which rarely happens in practice. This case clearly shows the fact that it is almost impossible to pass the exam by "throwing dice" without working hard on weekdays. This case is very close to students' lives and is closely related to students. It can quickly attract the attention of students and arouse their interest and curiosity. Many students may have already had this question in their mind. It can give students a clear explanation of this question, and its moral education effect is very obvious and efficient.

If a factory has more than one production line, and the production capacity (output) is not the same, the result of sampling inspection is unqualified, how to recover the loss caused by it? How to divide responsibilities more fairly and equitably? This is one of the applications of bayes' formula. After explaining the content, we can remind the students to pay attention to that in the future, if they engage in related work, they must control the quality strictly, especially the food safety issue, which concerns the health of the people, the lives of thousands of families, and even the people's trust in a country. The "Wolf is coming" story can also be explained from the perspective of probability [2], using Bayes formula to calculate how the lying children gradually lose people's trust. So as to educate the students to be an honest person.

When we talk about exponential distributions, we can start by telling students that the probability a component will be able to use at least t hours if it has been used for s hours is equal to the probability it will be able to use at least t hours, which means that the component has no memory for having used s hours. The conclusion against to the experience of many students, we may guide students to have a group discussions, and let the students get this conclusion through strict mathematical derivation, this helps to improve students' scientific literacy, inspire students' thinking and help students gain a sense of achievement, so as to improve the students' learning interest and motivation.

In the explanation of marginal distribution, we can give an example: 2 white balls and 3 black balls are packed in the bag, there are two ways:one is putting the ball back after watching it's color, the other is do not put the ball back after watching it's color. The following random variables are defined

$$X = \begin{cases} 1, & first \ time \ we \ got \ a \ white \ ball \\ 0, & first \ time \ we \ got \ a \ black \ ball \end{cases},$$

$$Y = \begin{cases} 1, & second \ time \ time \ we \ got \ a \ white \ ball \\ 0, & second \ time \ we \ got \ a \ black \ ball \end{cases},$$

Find the joint distribution and marginal distribution of (X,Y) under two ways of .

The joint distribution can uniquely determine the marginal distribution, whereas the marginal distribution cannot generally determine the joint distribution. This reflects the rigor of mathematics and helps to improve students' cognition of dialectical materialism.

Chebyshev law of large Numbers shows that [3]: under the condition of the theorem, if n is large enough, the average number of these n independent random variables possess a low level of dispersion degree. This means that after the arithmetic mean of the random variables will be densely gathered in its near mathematical expectation, the result of average number minus mathematical expectation convergence in probability to zero. This part can strengthen students' understanding of dialectical materialism, and inspire students to try to adopt the method of average value in the selection of certain data in the future scientific research work, which is not only a conventional thinking, but also a reasonable method.

Mathematical explanation of the profit problem of insurance companies. When learning the central limit theorem, we can give the example:there is an insurance company has 10,000 people in the same age and class participating in life insurance. It is known that such people have a 0.006 probability of dying within a year. Each insured person pays RMB 12 of premium at the beginning of the year, and his/her family receives RMB1000 from the company when he/she dies. Q: in this business activity: 1. What is the probability that the insurance company loses money? 2. What is the probability that the insurance company will make a profit of not less than RMB 40,000?

Using the central limit theorem, the results are 0,99.52% respectively. On the one hand, I can clearly explain my professional knowledge; on the other hand, I can tell students to understand the insurance industry with an objective attitude; at the same time, I can remind students to make their own contributions to the improvement of the insurance industry environment if they take the positions related to insurance in the future.The central limit theorem also reflects the idea "quantitative change causes qualitative change" too, which can remind students to avoid "fishing for three days and drying the net for two days" in daily life, and encourage students to persevere in something, so that they can get closer to the goal.

One way to explain the hypothesis test. On the one hand, it tells you what you infer, and on the other hand, it tells you that the test might be wrong. This seems to be a contradiction, but in real world such things are too numerous to mention one by one, which contains a profound materialist dialectics thought.

Never say never, think much and listen much in your life, the truth maybe not what you think.

## CONCLUSION

In order to carry out ideological and political education better, improve students' interest in learning, and realize the effective combination of ideological and political education and curriculum teaching, we continue to reform and explore the curriculum ideological and political education and teaching. Firstly, a new design of course teaching is carried out, Secondly, we explore the ideological and political elements out deeply. Finally, students are encouraged to do more extracurricular extended reading, and students are required to write their own experience after completing the extended reading, which is counted into the homework score, so as to put ideological and political education into practice. It can cultivate people, moisten things silently and improve teachers' ideology and education skills. We can further study the teaching reform of probability theory and mathematical statistics under the model of Internet + curriculum ideological and political education.

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