**Abstract:** Based on the teaching content of probability theory and mathematical statistics, we design ideological and political cases in combination with real life, deeply dig the "Ideological and political elements" contained in the cases and the ideological and political education functions they carry, organically integrate the ideological and political elements into classroom teaching, organically unify "knowledge impartment" and "value guidance", so as to build morality and cultivate people, Cultivate useful talents with socialist core values.

**Keywords:** Curriculum thought and politics; Probability theory and mathematical statistics; Case teaching

I. RESEARCH BACKGROUND OF CURRICULUM THOUGHT AND POLITICS

At the National College Ideological and political work conference in 2016, general secretary Xi Jinping stressed that "all courses should be well protected by a certain channel and responsibility fields, so that all kinds of courses and ideological and political theory courses should work together to form synergy." Ideological and political theory courses should be organically combined with various required courses such as public compulsory courses, public elective courses and specialized courses. Carry out ideological and political education in the course teaching, run the ideological and political work through the whole process of education and teaching, and realize the whole process and all-round education. Various professional courses are relatively far away from ideological and political education, and their "curriculum ideological and political" reform has not been really carried out, which will be the focus of reform in the future [1]. To realize the ideological and political education of professional courses, professional course teachers should clarify the generation logic of "curriculum ideological and political education", establish a scientific thinking of "curriculum ideological and political education", form a methodological system of professional curriculum ideological and political education, and then accurately extract the ideological and political elements of professional courses and integrate them into professional teaching [2]. Under the background of "curriculum ideological and political" teaching reform, various professional courses have been effectively reformed and tried [3-4]. Probability theory and mathematical statistics is a public compulsory course offered in the second year of colleges and technical secondary schools. It is a prerequisite course for some professional courses. It has a wide range of courses and basically covers students of all majors. Sophomore year is also a critical period for college students to enter professional learning and the formation of world outlook and values. It is very important to integrate people, curriculum thought and politics in curriculum teaching.

II. THE TEACHING SITUATION OF PROBABILITY THEORY AND MATHEMATICAL STATISTICS

Probability theory and mathematical statistics are a science that studies the statistical regularity of random phenomena. The theoretical method is based on the axiomatic structure, with strict theory and complete system. At the same time, it is very practical. Many important statistical ideas and methods come from practice and are applied to practice. The teaching contents of most colleges and technical secondary schools are the teaching methods and means are single, and the teaching mode is backward. In terms of teaching content, the idea of emphasizing theoretical basis and neglecting application has been followed. The teaching content has been almost unchanged for decades, and the teaching content is seriously divorced from application. In terms of teaching methods and means, teachers give priority to teaching, adopt "full house irrigation", pay more attention to the training of students' mathematical derivation and computational energy, and ignore the teaching of probability theory and mathematical statistics. As a result, we find that although students can better master the basic knowledge of probability theory and mathematical statistics, But when it comes to practical problems, students often don’t know how to analyze and solve problems. In the teaching mode, teachers teach, students passively accept, teachers and students lack the necessary communication and communication, and students do not have the opportunity to think independently and practice, which is not conducive to cultivating students’ ability to analyze and solve problems, and developing students’ innovative thinking.

In the long run, many students'; learning enthusiasm has been seriously frustrated, resulting in weariness, which has seriously affected the effect of teaching. Therefore, how to change the current situation, turn students into the main body of learning and mobilize their learning enthusiasm is an urgent problem to be solved in education.

III. THE NECESSITY OF INTEGRATING THE CASE TEACHING OF PROBABILITY THEORY AND MATHEMATICAL STATISTICS INTO THE COURSE OF IDEOLOGICAL AND POLITICAL EDUCATION

Firstly, the integration of case teaching of probability theory and mathematical statistics into Curriculum Ideology and politics can promote teaching reform and quality education of college students. With the development of modern science and technology, high-quality applied talents are favored by everyone. In the past, the traditional teaching of emphasizing theory and neglecting application does not adapt to the cultivation of talents. Teaching reform is imperative. Probability theory and mathematical statistics can combine some cases and theoretical knowledge in real life through case teaching,
stimulate students’ learning interest and enthusiasm, and guide students how to find, ask and solve problems. It changes the situation that teachers teach and learn passively in traditional teaching, students become the main body of learning, and subverts the traditional teaching mode. Case teaching can cultivate students’ ability to analyze and solve problems, develop students’ creative thinking and promote college students’ quality education. Secondly, integrating the case teaching of probability theory and mathematical statistics into the course of Ideological and political education can cultivate college students’ national consciousness and patriotism. Integrating the deeds and achievements of some advanced figures in China into the case teaching of probability theory and mathematical statistics can imperceptibly cultivate college students’ national consciousness and patriotism, realize the great ideological and political education concept of whole process and all-round education, and cultivate socialist builders and successors with all-round development of morality, intelligence, physique, beauty and labor for the country.

IV. CASE DESIGN OF INTEGRATING CASE TEACHING OF PROBABILITY THEORY AND MATHEMATICAL STATISTICS INTO CURRICULUM THOUGHT AND POLITICS

Because the theory and method of probability theory and mathematical statistics are applied in all fields of science and technology, industrial and agricultural production, medicine and health and various departments of the national economy. As Laplace, the great master of science, said, “the most important problems in life are essentially probability problems.” most of the contents and topics of probability come from life. Teachers design teaching cases, excavate ideological and political elements, promote the construction of “curriculum ideological and political”, moisten things silently and cultivate people with virtue.

Case 1: When explaining hypothesis testing, you can introduce Professor Xu Baoxiang, a pioneer in probability theory and mathematical statistics in China. He initiated the teaching and research of probability theory and mathematical statistics in China, and is recognized as the first Chinese mathematician with international reputation in mathematical statistics and probability theory. Some foreign scholars praised Xu Baoxi as "one of the most profound and creative statisticians in the 20th century". Professor Xu Baoxiang has made outstanding achievements in Neiman Pearson theory, parameter estimation theory, multivariate statistical analysis and limit theory. He is one of the pioneers of multivariate statistical analysis. So far, Xu Baoxiang’s photo is still hanging on the corridor of the Department of statistics of Stanford University, side by side with world-famous statisticians. The advanced deeds of Professor Xu Baoxiang can enhance students’ national pride and improve students’ national consciousness and patriotism.

Case 2: Explain "integrity" by using full probability formula and bass formula.

In recent years, the integrity crisis has gradually become a hot topic, such as whether the elderly fall to the ground or not? When we need to cooperate with others to tide over the difficulties, do both partners trust each other enough and whether the other party is trustworthy? The following ideological and political cases can be designed for trust.

Example 2.1 (Exploring neighbors with flowers) Xiao Wang is going on a business trip for a few days. He has a pot of flowers at home and gives them to his neighbors to take care of. If it is known that if neighbors remember to water within a few days, the probability of flower survival is 0.8. If the neighbor forgets to water within a few days, the probability of flower survival is 0.3. Assuming that Xiao Wang doesn’t know his neighbors, it can be considered that the probability that he remembers and forgets to water is 0.5. Ask the question (1) what is the probability that the flower is still alive when Xiao Wang comes back days later(2) If the flowers are still alive, what is the probability that the neighbors will really water them? How has trust in neighbors changed?

Problem solving (1) set up \( A \) It means that the neighbors remember to water the flowers, \( A^c \) It means that the neighbor forgot to water the flowers, \( B \) Means the flower is alive.

\[
P(B) = P(A)P(B|A) + P(A^c)P(B|A^c) = 0.5 \times 0.8 + 0.5 \times 0.3 = 0.55, \\
P(A|B) = \frac{P(A)P(B|A)}{P(B)} = \frac{0.5 \times 0.8}{0.55} = 0.7273.
\]

I ideological and political element mining Xiao Wang’s trust in his neighbors was 50%, but since he came home from a business trip and found the flowers alive, his trust in his neighbors has increased to 72.73%. Through the topic “exploring neighbors with flowers”, let students realize that trust can be increased. We should cherish every detail of life. Try our best to do well what others entrust, and your impression (trust) will be higher and higher.

The following example tells us that if we blindly waste other people’s trust, the consequences are very serious.

Example 2.2 (the wolf is coming) Once upon a time, in a quiet and remote mountain village, there was a child who drove flocks of sheep to eat grass in the mountains every day. One day, the little boy was bored and wanted to do something “exciting”, so he shouted, “the wolf is coming! The wolf is coming!” The villagers at the foot of the mountain took up “weapons” and rushed out to fight the wolf, but there was no trace of the wolf on the mountain. The people went back strangely and helplessly.

The next day, the child repeated his old trick and deceived the mountain people again, shouting: “the wolf is coming! The wolf is coming!” after hesitation, the mountain people took up arms again to fight the wolf. When they came to the mountain, they found that they had been deceived by the little boy again.

On the third day, the wolf really came, but this time no matter how the child shouted, no one went up the mountain to save him. Finally, the sheep were chased by the wolf.

Ask questions The same cry, why did the tragedy happen later?

Problem solving Firstly, make the following assumptions: the villagers’ initial trust in children is 0.8, the probability that credible children are considered to lie is 0.1, and the probability that untrusted children are considered to lie is 0.5.
set up $A$. It means that the child is credible, $\tilde{A}$: It means that the child is not credible $\tilde{A}$. A child is considered to be lying when the villagers heard "the wolf came" for the first time, there were

$$P(A) = 0.8, P(\tilde{A}) = 0.2, P(B|A) = 0.1, P(B|\tilde{A}) = 0.4.$$  

From the Bayesian formula, we get:

$$P(A|B) = \frac{P(A)P(B|A) + P(\tilde{A})P(B|\tilde{A})}{P(B)} \approx 0.444.$$

When the villagers heard "the wolf is coming" for the second time, they were surprised

$$P(A) = 0.444, P(\tilde{A}) = 0.556, P(B|A) = 0.1, P(B|\tilde{A}) = 0.9.$$  

Again, from the Bayesian formula, we get

$$P(A|B) = \frac{P(A)P(B|A) + P(\tilde{A})P(B|\tilde{A})}{P(B)} \approx 0.138.$$

When the villagers heard "the wolf is coming" for the third time, they were surprised

$$P(A) = 0.138, P(\tilde{A}) = 0.862, P(B|A) = 0.1, P(B|\tilde{A}) = 0.9.$$  

Using Bayesian formula for the third time, we get

$$P(A|B) = \frac{P(A)P(B|A) + P(\tilde{A})P(B|\tilde{A})}{P(B)} \approx 0.031.$$  

**Ideological and political element mining** When the villagers first heard that "0.80.444", "0.4440.138" and "0.1380.031" wolves came, they ran to the mountain and found that they were cheated, and their trust in the children decreased from it. When the villagers heard the wolf coming for the second time and found that they were cheated again on the mountain, their trust in the child decreased from to. When the villagers heard the wolf coming for the third time, their trust in the child decreased from to. This example shows that with the development of the causal cycle of events, a person's trust can be reduced from a higher level to a lower level, resulting in more serious consequences.

**Perception of two examples** ① These two stories tell us: first, "we must be honest in life". Second, with the development of event causality cycle, trust can increase or decrease. ② how to increase trust? Students should start from every bit of life, such as: first, make rational use of credit cards and repay on schedule. Second, before you promise your friends, consider your actual ability. Once you promise, do your best to complete it, so as not to lose faith with others and increase your trust. Third, after someone helps yourself, you should know how to be grateful. We should not let our trust become a burden on others, let alone understand others’; help as "deserved".

**Case 3:** Using "3" of normal distribution $\sigma$ Principle of proper rights protection

**Example 3.1** $(3\sigma$ Criteria) design $X \sim N(\mu, \sigma^2)$ Then

$$P(|X - \mu| \leq \sigma) = 0.6826, P(|X - \mu| \leq 2\sigma) = 0.9545, P(|X - \mu| \leq 3\sigma) = 0.9973,$$

so $P(|X - \mu| > 3\sigma) = 0.0027$. In other words, if 10000 samples are taken from the population, 9973 fall in the interval $[\mu - 3\sigma, \mu + 3\sigma]$. Internally, this is statistically called a normal distribution $3\sigma$ Guidelines.

Ask questions if a factory implements "3$\sigma$Criterion ", i.e. interval $[\mu - 3\sigma, \mu + 3\sigma]$ Internal products are all qualified products. Why do different users' evaluations of products of the same brand vary greatly?

Q & A if a factory implements "3$\sigma$Criterion" This means that only 27 of the 10000 products are defective; if $\mu$, $\sigma$ Remain unchanged, the company implements " $2\sigma$Criterion ", which means that there are 455 defective products in 10000 products. Comparing the two, it can be found that 428 products have different definitions of product quality when implementing different criteria. If the company implements "3$\sigma$ A student just bought one of these 428 products, so the items he bought are more prone to quality problems. We can say that the student bought "defective products among qualified products". This explains why the evaluation of different users of products of the same brand will vary greatly.

**Ideological and political element mining** Through this example, we can appeal to: (1) companies can’t blindly increase $\sigma$ To reduce the number of defective products, which will only make a large number of edge products included in the ranks of genuine products; the company should try to improve product quality, make product quality more stable and reduce the variance of product quality $\sigma$. So that more products are gathered in the expected value $\mu$. Nearby, so that users’ evaluation of the product will be more consistent. (2) for users, if they just buy "" which is prone to quality problems. The defective products in the qualified products must be treated correctly and protected properly, rather than maliciously denying the brand. This example can explain the phenomena in life from the perspective of probability, and can also guide
students in the right direction to avoid extreme behavior. If the factory can improve the product quality as much as possible and citizens can protect their rights properly, it will create more harmony. The relationship between supply and demand

Case 4 central limit theorem and ideological and political teaching design

Normal distribution is very common in peoples’ real life, such as peoples’ height, weight, students’ grades, errors of various parts sizes, etc. these random variables obey normal distribution

Ask questions In real life, why do many quantitative indicators obey or approximately obey the normal distribution? With this question, guide students to learn the content of the central limit theorem, excavate ideological and political elements from the conditions and conclusions of the theorem, let students deepen their understanding and memory of knowledge while learning n knowledge, and guide students to carry out ideological and political education

Example 4.1(central limit theorem of independent identically distributed) $X_1, X_2, \cdots, X_n \cdots$ Is a sequence of independent and identically distributed random variables, and

$$E(X_i) = \mu, D(X_i) = \sigma^2 (i = 1, 2, 3 \cdots), \text{for any } \epsilon > 0,$$

yes

$$\lim_{n \to \infty} P \left\{ \frac{\sum_{i=1}^{n} X_i - n\mu}{\sqrt{n}\sigma} \leq x \right\} = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x} e^{-\frac{t^2}{2}} dt.$$

This theorem tells us that as long as the series of random variables are independent and identically distributed, and the expectation and variance exist, the sum of these random variables approximately obeys the normal distribution.

Problem solving There are many quantitative indicators in real life, such as peoples’ height, weight, students’ grades, etc. each of these indicators is superimposed by a large number of independent random factors. The influence of each factor in these factors is small. If the influence of none of these factors plays a prominent role, the superposition of these factors will form a normal distribution. The normal distribution changes with time. The density function curve of machine variable is beautiful, and the distribution plays a very important role in our real life.

Ideological and political element mining

From this theorem, we can get two enlightenment: (1) as long as $X_1, X_2, \cdots, X_n \cdots$ It is a sequence of independent and identically distributed random variables. Even if they do not obey the normal distribution, the limit distribution of the sum of N random variables is normal distribution, which is the reason why quantitative change causes qualitative change. Guide students to make considerable progress at the end of four years of university if they work harder every day. (2) In the process of building the country, each of us is an independent individual, and each of us has little power. As long as we all have the same goal, our joint efforts will realize our beautiful Chinese dream.

CONCLUSION

Curriculum ideological and political education is to integrate ideological and political education into curriculum teaching and achieve "all staff, whole process and all-round" education. This paper takes the theoretical knowledge of probability theory and mathematical statistics as the carrier and closely combines "Building Morality and cultivating people". Under the ideological and political concept of the curriculum, the ideological and political case design of probability theory and mathematical statistics curriculum is expected to feed it back to the teaching materials and teaching process. On the one hand, it can establish morality, nourish people and things silently, on the other hand, it can improve students’ interest in learning, deepen students’ understanding of knowledge and improve students’ thinking ability. It can be studied in the future. The teaching reform and practice of probability theory and mathematical statistics under the mode of "Internet + curriculum thought and politics", and popularize the achievement with the help of media.

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