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The Path Exploration of Ideological and Political Education in Probability Theory and Mathematical Statistics Courses under the Background of "All-staff Education"

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Abstract: This paper analyzes the difficulties of students learning the course and integrating the ideological and political elements into the ideological and political education, and puts forward that the ideological and political education must be organically integrated with the explanation of the course knowledge points. It must be "moistening things silently," and cannot become a simple sermon. It must be understood by students from different backgrounds and be widely accepted. The article also combined ideological and political cases to elaborate on the above ideas.

Keywords: Probability theory and mathematical statistics; Curriculum ideology and politics; Case; Educate all staff

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1. Curriculum analysis under the background of "all staff education"

Probability Theory and Mathematical Statistics is a subject that studies the statistical regularity of a large number of random phenomena and is a required course for science and engineering majors [1]. The course is rich in content, with many concepts, properties and theorems. It is closely related to life and has strong practicability. Through the teaching of this course, students can initially master the basic ideas and methods of dealing with random phenomena, cultivate students ability to use probability statistics to analyze and solve some related practical problems and cultivate students' correct thinking methods and modern mathematical consciousness. To cultivate students' patriotic spirit, innovative spirit and artisan spirit of excellence [2].

Some students have a poor learning foundation, lack of self-discipline in learning, and lack of ability to analyze and solve problems, which lead to certain difficulties for students in learning the course well [3]. Therefore, how to find a new way and actively explore the teaching and learning mode under the concept of "educating all students" is particularly important. It is an effective way to integrate ideological and political

elements into classroom teaching [4], improve the understanding of the importance of the course, cherish the learning opportunities, set up lofty ideals and study hard, and actively participate in the socialist modernization construction after graduation.

2. Ideological and political elements in the existing dilemma

It is necessary to carry out ideological and political education in the curriculum, which is to solve the problem of who to train, how to train people and for whom to train people [5]. There are still some difficulties in carrying out good ideological and political education in Probability Theory and Mathematical Statistics to achieve mutual integration and exchange. The performance is as follows:

(1) The course has its logical system and internal structure, a complete knowledge system, ideological and political elements and course content to match effectively is a difficult point, if only the ideological and political knowledge points, there will be two failures of knowledge imparts and ideological and political education. This course has a lot of content and requires high thinking ability and solving practical problems, which needs time to digest and absorb. In the limited class hours, in addition to the completion of knowledge imparting, but also interspersed ideological and political education, so that moistening things quietly, the grasp of timing and time is very important. Teachers have an insufficient understanding of ideological and political education in the curriculum, and think that their job is only to impart knowledge, only to teach the content of the outline, even if the task is completed. Ideological and political education should be the work of ideological and political teachers and counselors, and the idea of educating people by all members has not been formed.

(2) Ideological and political education, in addition to a solid professional foundation, also have a good personality charm and broad vision, so teachers must improve ideological understanding, study professional knowledge, improve the knowledge structure, and effectively ideological and political education and value guidance throughout the whole process of classroom teaching.

(3) From the perspective of students themselves, each student has their knowledge background and psychological characteristics, and their acceptance of curriculum ideological and political education is inconsistent. Therefore, curriculum ideological and political education should not only be mechanically attached to the course content learning, otherwise, it will become a simple lecture, which will not have the effect of educating people and will also reduce students' enthusiasm for learning the course [6–8].

3. Exploration of the path of curriculum ideological and political education

Based on the various difficulties in the integration of ideological and political elements into the curriculum, it is necessary to explore and practice from the aspects of organic integration of ideological and political elements with the knowledge points of the course, the choice of the opportunity for the integration of ideological and political elements, and the universality of the audience of ideological and political education.

3.1. Condense ideological and political elements and compile ideological and political cases

Introduce the deeds of domestic mathematicians in the field of probability theory and statistics to foster cultural confidence and cultivate an indomitable spirit. In the preface, the main contributions of Xu Baolu, the founder of probability theory and mathematical statistics in China, can be introduced. He originally studied and

taught at the University of London in the UK, but with his heart set on his motherland, he decided to return to China after achieving success in his studies and established the first probability and statistics course at Peking University. His research contributions in Neyman-Pearson theory, parameter estimation theory, multivariate analysis, and probability theory can also be briefly introduced in the teaching process along with the relevant knowledge points. For instance, when teaching the content of parameter estimation, one can also introduce Xu Baolu's work in this area. Professor Peng Shige established the theory of dynamic nonlinear mathematical expectation. When teaching classical mathematical expectation, one can also introduce Professor Peng Shige's work in nonlinear mathematical expectation (which is currently a hot research topic internationally). When introducing the definition of frequency, one can also introduce the story of ancient Chinese mathematician Zu Chongzhi, who used the limit idea of "cutting a circle to find its circumference" to accurately calculate the value of pi to the seventh decimal place. Introducing the contributions of Chinese mathematicians in probability theory and mathematical statistics can not only allow students to learn some cutting-edge knowledge but also enhance national confidence and patriotic enthusiasm, enabling them to study harder for the construction of the motherland [9–11].

3.2. The discussion of case teaching to do "moisten things silently" ideological and political education

Curriculum ideological and political education should be organic integration with the course content, and can not only become preaching education, otherwise, it will lose the original intention of teaching and educating people, which requires the selection of ideological and political elements must be highly compatible with the course knowledge point, ideological and political education to be "moisten things silent." The following introduces how to choose the right ideological and political elements through specific cases, to effectively connect the ideological and political elements with the course knowledge points, and to get twice the result with half the effort [12].

When teaching the knowledge point of classical concepts, we can cite a case of "birthday problem." Case 1: Given that everyone's birthday is equally likely 365 days out of a year, what is the probability that at least two people have the same birthday, chosen at random? $n \leq 365$

This is a classical probability, and students using classical probability methods and the properties of opposing events should be able to easily get its result as: . After obtaining this result, the student is then asked, if there are 20,30,50,80,100 students in our class, what is the probability that at least two students in the class have the same birthday? To get a specific probability value, you need to plug n in the actual class size from the above formula, which is a bit tricky. To save time, we can ask the students to guess if there are 50 students in the class, is the probability that at least two students have the same birthday greater or less than 50%? You can use the wisdom tree to vote online and see what percentage of students choose. The number of people who choose less than 50% is likely to be much larger than the number who choose more than 50% because the students will assume that there are 365 days in a year, and the chances of two out of 50 people sharing the same birthday should not be very high. Then the teacher announces the answer, and the n probability of taking different values is shown (**Table 1**).

Table 1. The probability that at least two people have the same birthday, *n*

n	20	23	30	40	50	64	80	100
P	0.411	0.507	0.706	0.891	0.970	0.997	0.999	0.9999997

After looking at the table, the students found that the result was completely different from their imagination. The probability of at least two people in a class of 50 having the same birthday was as high as 97%, much higher than 50%, indicating that the probability was very high. Here the teacher can carry out ideological and political education, telling the students that obtaining accurate conclusions cannot be taken for granted, and must be down-to-earth to carry out correct calculations, to get the correct judgment. To verify the correctness of the results, if the number of students in the class reaches more than 50 people, students can find the monitor after class to get each person's birthday data, to verify the correctness of the calculation.

When teaching the content of the small probability principle and event independence, the following cases can be designed. Case 2: The probability that a person will succeed in doing something is 0.01. What is the probability that he will succeed if he keeps doing it 5000 times?

First, let the students think about themselves, according to the knowledge of the calculation formula listed, calculation is more troublesome, the teacher can directly announce the answer is 0.9933. .

Next, the teacher can introduce the small probability principle and ideological and political education. The small probability principle means that the probability of this event occurring each time is very small, but if the number of times is repeated enough, the possibility of this event happening is very large. It shows that the quantity change to a certain extent can be qualitative change, so do not take the evil small, do not take the good small and not for, the idiom says that the dripping stone wears, the iron pestle grinds into a needle, where there is a will there is a truth, there is a scientific basis [13]. The students must have the spirit of perseverance, although this process is difficult, one day will succeed.

3.3. Ideological and political cases are closely related to contemporary practical problems so that students from different backgrounds are well educated

The selected ideological and political cases must be easy to understand. Otherwise, the students will not be interested and will not be able to educate people, so the selection of ideological and political elements should be carefully crafted, it is best to choose some common sayings, or some current hot topics to discuss. For example, when introducing the independence of random events, you can choose the following cases.

Case 3: Why is it said that "two heads are better than one"? What is the scientific basis [14]?

Tell the student that this is a mathematical problem, as well as a probability problem, which can be tested using the independent knowledge you have just learned. Transform a practical problem into a mathematical problem to solve this is the problem of mathematical modeling. By the way, I will introduce the importance of mathematical modeling and mathematical contests in modeling, and guide students to apply what they have learned and actively sign up for mathematical contests in modeling. How to transform it into a mathematical problem? You need to make a model assumption, to make the problem concrete, you can use the probability of solving something to reflect the degree of intelligence of a person, the probability of solving this thing is much smaller than the probability of solving this thing, if the three stooges work together to solve this thing, Is the probability of solving this thing equal to the probability of Zhuge Liang solving this thing?

This translates into the following probability problem: There are three stooges A, B, and C, the probability

of solving a problem is 0.4, 0.4, and 0.45, respectively, and the probability of Zhuge Liang solving the problem is 0.80, if the three work together to solve the problem, then the probability of the three stooges solving the problem is equal to the probability of Zhuge Liang solving the problem? This problem is a pure probability problem, let the students calculate, using the probability formula of the three events and the independence of the event knowledge, you can find the probability of three stooges to solve this problem is 0.802. This probability is equivalent to the probability of Zhuge Liang solving this problem, which verifies the proverb "Two heads are worth one head." The application of this case can make students realize the importance of teamwork inadvertently. Flying alone in the South, it is difficult to speak alone. It tells students that they must have the spirit of cooperation and collectivism. The wisdom of the crowd is far greater than the wisdom of the individual [15].

4. Summary

Under the wave of national curriculum reform, curriculum ideology, and politics have become an inextricable topic. According to the analysis of curriculum characteristics and learning situations, the effective case teaching proposed in this paper can be regarded as an effective way. How to effectively integrate ideological and political cases with course knowledge points is an important topic for all teachers, so that students can not only learn knowledge well, but also enhance their cultural self-confidence and patriotic enthusiasm, see the practical application value of the course, improve their motivation and interest in learning, and cultivate the quality of national feelings and responsibility for the country. At the same time, comprehensive talents with innovative and compound abilities can make their contribution.

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Disclosure statement

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