

Practice on Mixed Teaching Reform of Probability Theory and Mathematical Statistics

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Abstract: Probability theory and mathematical statistics courses are the basic courses of colleges and universities across the country. Its existence is to make basic preparations for the national society to train technical talents. Nowadays, there are a series of problems in the teaching of this course in various colleges. Students fail to be instilled with the essence of this subject, because the content of textbooks is leaning toward science, the number of short-term courses, and the fact that teachers use more theoretical knowledge. Generally, students can only understand a little theoretical knowledge and lack practice. This article refers to the existing problems of various colleges and universities, and proposes real-time reform of mixed practice teaching.

1. Introduction

Probability theory and mathematical statistics courses are generally offered in colleges and universities across the country, because this course can not only develop students' mathematical thinking, but also provide society with a steady stream of technical talents. Ideals are always good, but the reality is that the courses offered by various colleges and universities did not achieve the teaching goals. At present, the teaching methods, assessment methods, and curriculum arrangements of this course need to be reformed accordingly. In order for this course to play its true meaning, blended teaching can be added. Take blended teaching as the first attempt to reform the teaching plan of probability theory and mathematical statistics.

2. Teaching Status

Various colleges and universities still use instillation teaching for the courses of probability theory and mathematical statistics. As everyone knows, passive learning is very easy to forget knowledge. Moreover, theoretical knowledge is not combined with practice. As far as I know, probability theory and mathematical statistics courses emphasize application, but many teachers pay too much attention to theoretical notes. What society needs are technical talents, who can't survive if they only understand the theory but don't have the technical ability. Because students have many professional courses, various colleges have shortened the teaching time of probability theory and mathematical statistics courses. Students often have just learned some techniques and stopped

learning before in-depth practical research. Each student has a different level of acceptance of theoretical knowledge, and the teaching time is short while the teacher speaks quickly. Once students do not understand a certain point of knowledge, they will easily fail to keep up with the rhythm of the following courses.

3. The Meaning of Blended Teaching

Blended teaching refers to the simultaneous online and offline teaching mode. In addition to completing the teaching content in class, teachers can also make teaching videos online for students to learn from. Teachers can directly assign homework online, and can choose to live online to explain the exercises for students in time. Students can also pose problems that puzzle themselves to teachers in the live broadcast room, and discuss academic issues with teachers. Schools should focus on offline teaching, supplemented by online teaching. Online teaching can supplement the unsolved problems of offline teaching and effectively solve the problem of tight classroom time and many courses. In general, blended teaching can provide more learning opportunities and teaching resources for probability theory and mathematical statistics courses to help students study this course in depth.

4. How to Reform the Research and Practice of Blended Teaching

4.1 Reform of Online and Offline Teaching Methods

Classroom teaching is the main way for students to learn. First of all, teachers of probability theory and mathematical statistics courses are required to make simple and interesting PPT. Because there is so much theoretical knowledge in textbooks, and reading books often not only fails to fully obtain the key content, but also easily complicates the knowledge. Therefore, the content of the PPT produced by the teacher should clearly summarize the theoretical knowledge points of this lesson and simplifying the complexity. Secondly, some video operations can also be added to the PPT, because many knowledge points in the probability theory and mathematical statistics courses need to be operated. Students cannot practice in the theory class, but they can learn by watching the operation steps of others in the video.

4.2 Reform of Offline Teaching Content

The teaching content of probability theory and mathematical statistics course is to cultivate technical talents. This course mainly examines students' ability to analyze statistical data and teaches them to use statistics to analyze the probability of occurrence of real events. Besides, it cultivates students' mathematical thinking skills. This requires teachers to discover their own teaching problems and reform their own teaching modules, combine course content with life cases, and cultivate students' ability to use statistics to analyze actual cases. Teachers can set up some life question types. For example, a clothing city has two production groups, A and B. On average, one person in group A produces 30 pieces of clothing per day, with a standard deviation of 9. The daily production volume of a person in group B is as follows:

<i>Daily output</i>	<i>number of workers</i>
20	20
30	32
38	37
45	48

Ask: What is the daily output and standard deviation of a worker in group B? And through calculation and analysis, which group has more advantages in daily output? Let students train in

class and think about these types of questions independently. Incorporating the principles of statistics into this kind of life case can not only examine the students' arithmetical ability, but also expand their mathematical thinking.

4.3 Let Students Participate in Teaching Practice

Probability theory and mathematical statistics courses should use theoretical knowledge to solve practical problems in life. After graduation, employment needs technical talents, but students only have theoretical knowledge. That is not enough. Therefore, it is important to explain theoretical knowledge in the classroom and promote practical lessons on the computer. Arrange enough computer rooms so that every student can use a computer to complete the tasks assigned by the teacher. Use theoretical knowledge as a basis to guide practical operations. At the beginning, the teacher should demonstrate the operation and guide the students to operate correctly. During the process of getting on the computer, they should be good at discovering the incorrect operation of the students during the process of getting on the computer, and give correct and simple operation. Students must first complete their own homework independently, and do not copy other people's operations. However, if they encounter problems with their own operations, they can seek help from teachers or classmates. In the process of practice, the teacher should clearly tell the students that the practical operation will mean yes is yes, no is no. The students who can't do it should be open-minded, and the students who can do it should continue to study deeply. It is not necessary to pretend to understand or to be too conceited, so as to realize the meaning of offering practical courses. All colleges should focus on setting up practical courses on computers, which can not only provide students with practical opportunities, but also prepare the society for cultivating applied technical talents.

4.4 Reform of Operating Methods

For the courses of probability theory and mathematical statistics, the amount of calculation of the question type is very large and it is not easy to manually calculate. Some types of questions are computationally intensive but require students to be inspected, but what should they do if they are prone to errors? Therefore, teachers should not limit the form of homework submission. Simple question types and calculations can allow students to complete written calculations, which can examine students' mathematical thinking and exercise their computational skills. However, for complex and important question types, students can choose to provide electronic versions of homework. For example, for some probability questions need to calculate percentages and draw proportion graphics, etc. teachers can let students use computers to calculate and directly export the data to form pie charts, histograms, line charts, etc. They can also choose to submit online. The teacher assigns time-limited homework in the learning software, and students only need to complete the homework within the specified time. As a mode of investigation, the focus of homework is to help students further master their knowledge. Therefore, no matter which homework submission method students use, they must examine their statistical thinking and choose a simpler homework submission method for them.

4.5 Reform of Assessment Methods

According to previous teaching assessments, most colleges have adopted written examinations. At present, some colleges and universities are gradually adopting the form of computer to assess students. A comparison of the two can clearly reveal that the courses of probability theory and mathematical statistics are more suitable for computer-based assessments. Because this course pays

more attention to the content of practice and practice brings true knowledge. Written examinations often only examine theories and some basic question types. Questions that are truly statistically significant generally cannot appear on the written examination papers because the calculations are complicated. However, this kind of problem can be solved on the machine. The computer can calculate a large amount of data for students, and the answer can be obtained quickly and correctly as long as the appropriate calculation formula is selected. Therefore, if you learned the knowledge for a semester and you just investigated the theory, will it not be wasted? Applying the knowledge you have learned to practice is really mastering statistics.

5. The Significance of Mixed Teaching Reform and Practice

Reforming blended teaching with the times can concentrate a variety of excellent teaching programs and integrate them into the teaching classroom, so that students can experience the joy of learning probability theory and mathematical statistics. It can also allow students to learn more practical skills and accumulate more knowledge and experience during the process of getting on the computer, so as to prepare for future social work. Therefore, various colleges and universities need to study and reform the blended teaching plan, strive to provide the society with applied talents, and alleviate the current situation of scarcity of talents in the country.

6. Conclusions

There are many and complicated knowledge theories in the courses of probability theory and mathematical statistics, and the traditional teaching mode can no longer produce good teaching results. Therefore, reforming the teaching plan of this course is one of the key tasks of various colleges. Combining blended teaching with the actual teaching situation of various colleges and universities can provide students with more learning resources online and offline, and effectively solve the problem of probability theory and mathematical statistics with multiple courses and time constraints. It is important to set up computer courses to train students' practical skills and lay a solid foundation for entering social work.

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References

- [1] Xie Keren(2019). *The Cultural Construction of Blended Teaching*[J]. *Science and Technology Vision*, no.21, pp:147-148.
- [2] Lu Jing, Zhai Juan(2013). *Discussion on the teaching reform of probability and statistics under the perspective of application-oriented talent training*[J]. *Journal of Guangxi Normal University for Nationalities*, no.6, pp:90-92.
- [3] Zhang Cuijie, Liu Guangxuan(2014). *Some thoughts on the teaching reform of probability theory and mathematical statistics under the CDIO educational philosophy*[J]. *Mathematics Learning and Research*, no.12, pp:65-66.
- [4] Rodin(2015). *A Preliminary Study on the Teaching Reform of Public Mathematics Courses in Universities under the Condition of Limited Class Hours*[J]. *Education Teaching Forum*, no.12, pp:136-137.
- [5] Xiao Li(2016). *A preliminary study on the teaching reform of "Probability Theory and Mathematical Statistics" under the MOOC Mode*[J]. *Higher Education Exploration*, no.7, pp:78-80.
- [6] Liu Ren(2017). *A preliminary study on the teaching reform of "Probability Theory and Mathematical Statistics" under the MO Class Mode*[J]. no.49, pp:224.
- [7] Yuan Xiaohua, Du Tianxia(2017). *A brief talk on the classroom teaching of "Probability Theory and Mathematical Statistics" [J]. no.5.*