How to cultivate students' application ability in teaching probability and mathematical statistics

Li Zhang

College of Mathematics and Information , China West Normal University, Nanchong, 637000, China

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Abstract. The course of probability and mathematical statistics is a required course in Chinese colleges. This course has wide application fields, so college teachers should not just make students master solid theoretical knowledge, but also pay attention to cultivating their practical application ability. Students' practical application ability may be gradually cultivated only through changing traditional knowledge infusion mode and the teaching mode of repeating what the book says and actively introducing student-oriented new teaching modes. This paper proposes several modes to cultivate students' application ability, including example teaching, discussion teaching and software experiment teaching. Meanwhile, extracurricular practice activities should be organized for students

Foreword

Knowledge understanding, mastery, application and practice cannot be completed in an action. So, cultivation of students' ability to apply the knowledge of probability and mathematical statistics is a long-term and arduous task. During teaching probability and mathematical statistics, teachers should first enhance students' cognition of practicability of probability and mathematical statistics, improve students' cognition of applying it in practice, stimulate students' learning enthusiasm and interest in combination of example teaching, discussion teaching and software teaching and cultivate students' ability to apply probability and mathematical statistics.

Pay attention to thinking development and improve students' application consciousness

Each subject has its own thinking mode. Corresponding knowledge hierarchy is established under the guidance of such thinking mode. The ultimate pursuit and the supreme goal of education are to cultivate people's self-study ability and interest. During teaching probability and mathematical statistics, teachers should not rigidly inculcate theoretical knowledge, but teach students the thinking mode of the subject so that they can master thinking methods of probability and mathematical statistics problems and find solutions. The course of probability and mathematical statistics has wide and rich application background. During classroom teaching, teachers should select the entry points to combine with practical production and life so as to stimulate students' learning enthusiasm and interest and cultivate their application awareness [1]. Abstract probability and mathematical statistics include wide probability and probability thinking mode. If teachers just repeat what the book says, students can only remember some boring definitions and theories and cannot well solve probability and mathematical statistics problems, let alone apply the knowledge of probability and mathematical statistics in practice. Take probability theory for example. Observe random phenomena of things, analyze and conclude the law. Although the factors influencing the results are specific, the final result can only be gained through conjecturing. During teaching time probability, teachers can stimulate students' enthusiasm to apply the knowledge of probability theory in practice. Teachers can put forward the possibility that the dice shows 3 and the possibility of odd. Besides, teachers can propose the possibility of shooting. Through such simple problem, the thinking, discovery process and conclusion knowledge of the probability theory can be recovered. In this way, students can deepen understanding of "possibility" theory in the process of discussing and pondering over practical problems. Meanwhile, lively and pleasant classroom atmosphere is created. In relaxing atmosphere, teachers introduce the concept and definition of probability and mathematical statistics [2]. At the same time, Bernoulli model and law of large numbers can be

introduced in teaching through practical problems or physical model is introduced to visualize abstract theories. Besides, in statistical theory, the results are specific through applying practical inferring principle (i.e. the probability of approaching 1), but the influences on the results are unclear. In classroom teaching of probability and mathematical statistics, students discuss and analyze simple and familiar problems through introducing practical problems, make knowledge theory generating process reappear, know practicability of probability and mathematical statistics and cultivate the awareness of applying the knowledge of probability and mathematical statistics in practical problems. Meanwhile, in this process, students' thinking and analyzing ability as well as practical application ability is trained [3].

Cultivate students' application ability through example teaching

The knowledge of probability and mathematical statistics involves various aspects of production and life. During teaching probability and mathematical statistics, teachers should actively introduce production and life examples and cultivate students' ability to apply the knowledge of probability and mathematical statistics to solve practical problems. For example, every common distribution concept has common background. Poisson distribution theory is used to analyze "the number of customers entering the supermarket within certain time" and "the number of vehicles passing an intersection within certain time". Exponential distribution theory is mostly used to analyze "waiting time" or "the service life of electronic components". In addition, teachers can prepare abundant application cases of probability and mathematical statistics from life and social practice [4]. It is unnecessary to focus in large events during selecting examples. All examples which can fully reflect application of probability and mathematical statistics and cutting-edge development direction of the subject can be selected, such as the probability of winning the lottery, the probability of best-selling of a new product, conjecturing the admission score and comparison of curative effect of new and old medicines. It is required to mobilize students' learning enthusiasm and initiative, deepen students' understanding and mastery degree of probability and mathematical statistics and cultivate their ability to apply the knowledge of probability and mathematical statistics in social practice [5].

Organize students for extracurricular activities and expand application channel of probability and mathematical statistics

It is obviously insufficient to cultivate students' ability to apply the knowledge of probability and mathematical statistics only through classroom teaching. Practice has important functions to deepen apprehension and mastery of knowledge [6]. So, teachers should lead students to carry out extracurricular activities in an organized and planned manner and guide students to solve some common practical problems with the knowledge of probability and mathematical statistics, cultivate and train students' application ability according to subject features and teaching requirements. For example, after learning computing methods of the probability, teachers can guide students to carry out free lottery drawing activity: "10 same glass balls are placed in the bag, including 5 white glass balls and red glass balls; lottery drawers fetch 5 balls every time; if the 5 balls are white, 100 Yuan will be awarded; if 4 balls are of the same color, 10 Yuan will be awarded; if only 3 balls are of the same color, 3 Yuan will be fined". Students are required to analyze the proportion of vendors and lottery drawers. Then, students can change the data for analysis and research [7]. During teaching probability and mathematical statistics, some other rational activities can be carried out in succession. For example, students are required to "measure the height of students in the class and analyze whether it complies with normal distribution", "analyze mathematical expectation of vendors outside the school" and "research correlation degree of mathematical scores and the scores of other subjects in the class". Through introducing such activities, students can expand the approaches to use the knowledge of probability and mathematical statistics, comprehend probability and mathematical statistics exist in out life and flexibly apply the knowledge of probability and mathematical statistics to solve various propels in practical life only through striving to learn and master the knowledge of probability and mathematical statistics. Such activity teaching mode also

cultivates students' love for mathematics course and their wish to apply it in practice.

Carry out discussion course in teaching probability and mathematical statistics

Due to application universality of probability and mathematical statistics, many majors in colleges set probability and mathematical statistics as a required course. Example teaching method is discussed above. But due to wide examples, they do not own concentricity and pertinence. So, confounded situations often occur [8]. To help students know application field and mode of probability and mathematical statistics, teachers can introduce discussion teaching mode according to knowledge points of probability and mathematical statistics. If necessary, students can seek help from professional teachers. Especially in the second semester or final term, students know the knowledge of probability and mathematical statistics comprehensively and systematically. It is necessary to guide students to enhance communication with professional teachers and senior students, collect and accumulate relent data through the library and network platform and know the specific application of probability and mathematical statistics. Although students may not master professional knowledge, they can generally understand the application of probability and mathematical statistics. Teachers should guide students for independent thinking and autonomic learning and transform passive reception of knowledge. Teachers require students analyzing and discussing the data they collect and accumulate. In the discussion process, teachers should conclude and sort knowledge materials students collect and systematically connect the problems students put forward in class to help students know inner connection and sequence between professional knowledge and probability and mathematical statistics. The introduction of the discussion course can fully reflect the dominant role of students in class. Classroom discussion trains students' analysis and problem-solving ability as well as habits. Through interactions and discussions between students and teachers, teachers can organize the knowledge points students do not know well and cultivate their academic research attitude and habits [9]. Students cultivate their data collection and sorting ability during collecting and accumulating professional knowledge, master the approaches and methods to gain data, improve their data collecting and sorting ability, broaden their horizon and treat problems at a higher height.

Focus on software application teaching of probability and mathematical statistics

Probability and mathematical statistics involve mass data and calculation amount in data processing, so it is very necessary to let students grasp statistical software. If they cannot apply corresponding software, they cannot really apply probability and mathematical statistics. SPSS software owns such functions of data access, data analysis, data management and display. It can be used to calculate distribution probability, make graphs and prepare tables. It is widely applied in analysis of descriptive statistics, variance, regression and time series as well as model prediction and decision-making. The subject of probability and mathematical statistics has wide applications, including financial industry, securities industry, biology, medicine, education and sports. In academic exchange, algorithm descriptions can be exempted through analysis and calculation with SPSS software. This speaks volume for universality and authority of SPSS software [10].

During software teaching, teachers can combine theoretical teaching and practical teaching. During theoretical teaching, teachers can combine PPT software and SPSS software, display PPT slide via the computer in class and then apply projection technology to project the slide on the screen, enter example calculation and SPSS operating link through static introduction to theoretical knowledge with PPT slide. Teachers should give explanation of the conclusions gained through SPSS and finally demonstrate the whole dynamic process of processing data with SPSS. After static theoretical teaching is finished, teachers should organize students to operate the computer and guide them. Students still need to independently think and complete the whole process of data analysis with SPSS. Students are required to master basic operations and basic statistical capacity of SPSS software and train their practical ability and independent thinking ability through practical teaching.

Conclusions

Knowledge understanding, mastery, application and practice cannot be completed in an action. Cultivation of students' ability to apply the knowledge of probability and mathematical statistics is a long-term and arduous task. Teachers should actively introduce example teaching, discussion teaching and software experiment teaching in teaching probability and mathematical statistics. Meanwhile, teachers should organize students to carry out extracurricular practical activities. Students' practical application ability may be gradually cultivated only through changing traditional knowledge infusion mode and the teaching mode of repeating what the book says and actively introducing student-oriented new teaching modes.

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