

Construction and Practice of The Talent Training Model of "Focusing on Teaching, Strengthening Practice, And Promoting Innovation" in The Integration of Ideological and Political Theory and Mathematical Statistics Courses

Xiaobo Wen*

Sichuan Minzu College, College of Mathematics Physics and Statistics, Kangding, 626001, China

*Corresponding author: 541248034@qq.com

Abstract

This teaching reform is centered on serving the country's major strategic needs and the six advantageous industries and artificial intelligence industries in Sichuan Province. It takes the integration of "teaching, practice, and innovation" as the main line, and takes "practical ability precedes knowledge" as the core concept, aims at first-class undergraduate courses and advanced course construction, supports the knowledge of probability theory and mathematical statistics, guided by ideological and political integration, and takes the teaching form of "multi-in-one teaching, five-layer practice, and four-dimensional innovation", forming a curriculum talent training model innovation and practice system that "thick teaching, strengthen practice, and promote innovation".

Keywords

Course ideological and political education; multi-in-one teaching; five-level practice; four-dimensional innovation; talent training model.

1. Introduction

Probability theory and mathematical statistics are core basic courses in colleges and universities' majors such as mathematics and applied mathematics, computer science and technology, and veterinary medicine, and are also prerequisite courses in emerging fields such as data science and big data technology, machine learning, and artificial intelligence. As an important branch of mathematics, probability theory and mathematical statistics not only occupy a core position in the field of theoretical research, but also play an irreplaceable role in many fields such as engineering technology, social economy, and artificial intelligence.

Chen Aiting[1] research pointed out that with the advent of the big data era, probability theory and mathematical statistics courses need to adjust teaching content and methods to cultivate talents who adapt to the needs of big data analysis. Wang Ning [2]'s article discusses how to use Excel and other software to assist in the teaching of probability theory and mathematical statistics, and demonstrates the role of software in improving students' learning effects through specific cases. Chen Rui[3]'s research proposes to help students establish an intuitive understanding of the concept of probability theory at the cultural and philosophical levels by introducing Chinese classical philosophical thoughts and cultural elements, such as the stories of the "Tao Te Ching" and the "Book of Changes". Guo Liangdong [4]'s article discusses the teaching reform of probability theory and mathematical statistics courses in the context of the big data era, and emphasizes the innovation of teaching content, methods and means. Zhang Suhua [5]'s article discusses the mixed teaching process of probability theory and mathematical

statistics courses in the context of the "Internet +" era, and emphasizes the advantages of the teaching model combining online and offline in improving teaching effectiveness. Meng Ke [6]'s research pointed out that in the context of the information age, probability theory and mathematical statistics courses should adopt a hybrid teaching model to adapt to students' learning needs and improve teaching effectiveness. The article of Sna[7] explores the application of SPSS software in the teaching of probability theory and mathematical statistics courses, and demonstrates the advantages of software in data analysis through specific cases. Yang Guan[8]'s article explores the application of MATLAB in the course of probability theory and mathematical statistics through specific cases, providing teachers with teaching reference and reference. Zhao Xiuju [9]'s article discusses the application of online and offline hybrid teaching model in the construction of "golden courses" of probability theory and mathematical statistics, and emphasizes the advantages of this model in improving students' learning enthusiasm and teaching effectiveness. Xu Er[10]'s article discusses the application of the mixed teaching model based on MOOC in the course of probability theory and mathematical statistics, and emphasizes the transformation from "teaching knowledge" to "cultivating ability". Song Chao [11] designed and implemented a hybrid teaching based on BOPPPS to promote the development of students' thinking. Tian Donghong [12] relied on the OBE concept and the MOOC platform of China University, carried out the teaching reform and practice of the course. Zhang Lijing [13] explores the teaching design of penetrating probability theory and mathematical statistics through epistemology and methodology of materialism, emphasizing the combination of theory and practical cases to cultivate students' independent thinking ability and rational thinking ability.

Based on the predecessors, this article provides some new models and methods for the construction of probability theory and mathematical statistics courses.

2. Teaching Issues That Need to Be Solved by Curriculum Reform

Probability theory and mathematical statistics courses mainly have problems such as single teaching, formalization, and hollowing out innovation. The main expansion is as follows.

① Single curriculum teaching and a single talent training structure

Traditional teaching teaching is mainly based on teachers' classroom teaching. Course teaching lacks ideological and political integration, the quality of course teaching is mainly presented through final exams, lacks process supervision, and there is no student-centeredness in teaching.

This project takes the value guidance of teaching integrated into the ideological and political courses as the core, forming a systematic and distinctive online and offline course education connotation system.

② Formalize course practice and solidify practice methods

The content of course practice is difficult to reflect in theoretical courses. Even if there are practical links in some courses, they are still formal and lack flexible practical methods, making it difficult to apply.

This project aims to promote theoretical learning and cultivate the integration of knowledge and action in practice, and forms a curriculum education practice system that is solid and practice-driven.

③ Course innovation is hollowed out, students lack innovation

Innovation is an important part of talent training in colleges and universities and a key link in improving the quality of talent training. The lack of cultivation of students' innovative personality and innovative practices in traditional course teaching leads to mismatching students' innovative ability and social needs.

This project takes innovative education and improves the mechanism of collaborative education throughout the whole process and all-round collaborative education as the driving force, and forms an innovative education education mechanism with university research projects, college student innovation and entrepreneurship projects, and college student professional competitions as the output.

3. Reform Measures for Probability Theory and Mathematical Statistics Courses

3.1. Guided by "multi-in-one teaching", form a diversified talent training system for curriculum

① Ideological and political leadership, moral and intellectual coordination

Diversification of talent training goals has become an inevitable development of the times, but diversified talent training goals must be guided by correct values. In the course construction, we focus on the integration of ideological and political elements, and achieve ideological and political one lesson, and design cases such as "The Wolf is Coming" to analyze integrity education using Bayesian formulas. We have implemented the values-oriented "moral and intellectual collaboration" talent training goals and requirements.

② Online and offline hybrid teaching model

The course adopts a "online + offline" hybrid teaching model, providing rich teaching resources, interactive platforms and virtual experiments online. Offline classrooms focus on problem-driven collaboration with group, while maintaining the interactive and targeted nature of offline classrooms.

③ Common application of theory and practice

By organizing experiments, internships, training and other activities, students can personally experience the effects of probability statistics methods in actual application and improve their practical ability and innovation ability.

④ In-class and extracurricular expansion

The acquisition of course knowledge is not just a matter in the classroom, but it is also important to teachers' participation in students' development outside the classroom. Through the forms of teacher-student discussions, project co-construction, and competition, students' interest in learning is widely mobilized, and the learning of knowledge is expanded beyond the classroom for 45 minutes.

⑤ Process ending dual evaluation

Pay attention to students' performance and progress in the learning process, and integrate process evaluation throughout the entire teaching. Keep abreast of students' learning situation in a timely manner and provide targeted guidance and feedback. Use the evaluation model that combines process evaluation and finality to participate in students' growth throughout the process.

3.2. "Five-layer Practice" realizes seamless connection between courses and applications and employment

① Homework practice

Use course exercise practice to timely understand students' mastery of course knowledge, and improve the knowledge learning effect through continuous practice and improvement.

② Project Practice

Through college student research projects, college student innovation and entrepreneurship projects, and course experimental projects, students closely combine theoretical knowledge with practical applications to deepen their understanding and mastery of professional

knowledge; at the same time, during the project implementation process, students can get in touch with actual project development processes and methods, accumulate project experience, and improve students' ability to solve practical problems.

③ Competition practice

Through subject and professional competitions, students can use course professional knowledge to solve advanced and challenging mathematical problems in the competition.

④ Practical training practice

Use internships, internships, study and other opportunities to achieve flexible application of course knowledge, allowing students to accumulate work experience in actual work and improve their comprehensive qualities.

⑤ Social practice

Use social practice during winter and summer vacations to design questionnaires and analyze data results. Let students better understand and serve the society, and enhance their professional competitiveness.

3.3. Building "four-dimensional innovation" to achieve all-round development of curriculum innovation education

① Cultivate innovative spirit

Reform and innovate teaching methods to enhance students' innovative spirit. Use project-based teaching methods, flipped classrooms and other teaching methods to enable students to develop an innovative spirit.

② Innovative thinking development

Course teaching content, develop innovative thinking. In course teaching, students' innovative thinking is trained using course papers, course assignments, course experiments, etc. In course teaching, focus on cultivating students' interest in scientific research, and stimulate students' desire to explore by introducing the latest research results and application prospects in the field of probability statistics. By teaching scientific research methods, literature search skills, etc., and through training in literature reviews, writing of subject papers, etc., we help students master basic scientific research skills and lay a solid foundation for subsequent scientific research work.

③ Innovation ability training

Through university research projects and college student innovation and entrepreneurship projects, students can cultivate their project construction capabilities and train their innovative capabilities through teamwork to solve practical project problems.

④ Innovation awareness expansion

The competition project system for college students is expanded by combining probability theory and mathematical statistics courses.

4. Characteristics and Innovation of Probability Theory and Mathematical Statistics Curriculum Reform

4.1. Build a new "multi-in-one" teaching model

In-depth research on textbooks and accurately grasp the integration point between ideological and political courses and professional knowledge. Teachers and students in and out of the classroom participate together to expand learning time and space. The combination of theory and practice makes students' internalization of knowledge and improvement of ability. Online resources enrich learning channels, offline teaching strengthens interactive guidance, and teaching model innovation and learning experience optimization. The teaching evaluation that participates in the whole process will present the educational effect of the course in all

members, in all aspects and in the whole process. Build a new multi-in-one teaching model to ensure that students "moral and intelligent" collaborative education and effectively achieve knowledge imparting in the course. Form a multi-in-one teaching system of "ideological and political + five-level practice", "in-class + extracurricular", "theory + practice", "online + offline", and "process + end", and significantly improve students' ability to master basic knowledge.

4.2. Create a new "five-layer practice" curriculum system

Practice is the only criterion for testing truth. How to apply what you have learned, learn what you can and learn how to use it is to deepen understanding and mastery of knowledge, cultivate diverse and comprehensive abilities, enhance students' motivation and interest in learning, improve professional qualities and competitiveness, and adapt to social development and changes. Based on the core of practice, relying on applied mathematics laboratories, virtual simulation platforms, and Ganzi Prefecture enterprises and institutions, the courses are seamlessly connected with knowledge imparting and social needs through the closed-loop design of "five-layer practice", so that students have the ability to transform course knowledge into solving industrial problems.

4.3. New path to educating people with "four-dimensional innovation" architecture

We focus on the integration of probability theory and mathematical statistics courses with multi-disciplinary and multi-fields, and dig deep into the innovative points of the course in the fields of course lectures, course practices, professional competitions, project construction, etc. With the integration of course theory and practice as the core, the course structures the "four-dimensional innovation" education path of innovative spirit, innovative thinking, innovative ability, and innovative consciousness. Enable students to develop innovative literacy that wants to innovate, dares to innovate, can innovate, and promotes innovation. Effectively solve the pain points and difficulties of innovation hollowing out and improve the quality of talent training.

5. The Effect of The Promotion and Application of The Results

Take the probability theory and mathematical statistics courses I undertake at Sichuan Nationalities College. After 11 years of exploration and practice, this achievement has achieved remarkable results and has had a wide impact. After more than 3,000 undergraduate students in majors in Mathematics and Applied Mathematics, Computer Science and Technology, Data Science and Big Data Technology, classroom performance and satisfaction have been significantly improved. Students' satisfaction with course evaluation and teaching exceeds 95%, teachers and students' teaching, practice and innovation abilities have significantly improved, and the course training model has been well received by students and peers.

The teacher team has achieved remarkable teaching and research results, undertakes many teaching reform projects and scientific research projects, published dozens of papers, and many teachers in the project team have obtained AIGC artificial intelligence prompt word engineer certificates, and participated in dozens of related trainings around various courses.

The "Probability Theory and Mathematical Statistics" course has been built into a first-class undergraduate course at the school level of Sichuan Nationalities College.

Students' cognitive ability is enhanced. Since the project practice construction, more than 30 people have won the provincial third prize and above of the National College Student Mathematics Modeling Competition; more than 30 people have won the provincial third prize and above of the National College Student Mathematics Competition. In recent years, relying on the construction of this course project, students have further opened up the situation in the college student innovation competition and won many awards.

Students' ability to collaborate on practical problems is enhanced. Since the project practice construction, especially in the past five years, students have achieved good results in college student scientific research projects and college student innovation and entrepreneurship projects, completed many projects, completed many research reports and papers, especially in college student innovation and entrepreneurship projects, many projects have been approved as provincial construction projects.

Various school-level awards have enhanced the project's popularity within the school. The acquisition of many provincial and above rewards has enhanced the school popularity of Sichuan University for Nationalities and has also opened up the recognition of this achievement in the education circle of colleges and universities.

The course has built online course resources in learning, realizing online and offline hybrid teaching of the course; relying on the sub-projects and published papers built in this project, it covers the macro and micro parts of the course, and is widely cited and referenced in the course construction and paper publication of other universities. The members of this course team further promoted the scope of application of this achievement through lectures, serving as experts, and cooperating with other colleges, enterprises and institutions.

6. Conclusion

After 11 years of practical test, the results of teaching reform are very operational and reference-oriented, and play an important role in cultivating students' solid mathematical skills, skills to adapt to society, and ability to innovate and expand, and have promotional value.

Of course, the construction of curriculum reform is also a long way to go and it cannot be achieved overnight. It must be progressed step by step in teaching reform. Let schools also pay attention to curriculum construction from the institutional level and build institutional guarantees for curriculum teaching reform. Students are changing and learning situations are changing. Only by continuously teaching reform can curriculum construction achieve good teaching results.

Acknowledgements

Research on the ideological and political construction of the "Probability Theory and Mathematical Statistics" course in local ethnic colleges and universities under the sense of community of the Chinese nation, project number: X-JG202303.

References

- [1] Chen Aiting. Teaching research on probability theory and mathematical statistics in the context of the big data era [J]. Journal of Chifeng College (Natural Science Edition), 2018, 34(10):144-146.
- [2] Wang Ning, Sun Xiaoling. Design and implementation of experimental teaching cases of probability theory and mathematical statistics [J]. Journal of Hefei Normal University, 2014, 32(3):69-72.
- [3] Chen Rui, Li Guiping. Intuitive teaching from a cultural perspective: Research on teaching innovation in probability theory and mathematical statistics courses [J]. Journal of Chuxiong Normal University, 2024, 39 (3): 142-149.
- [4] Guo Liangdong, Martial Soldier. Research and practice of the reform of curriculum teaching in the era of big data [J]. Education and Teaching Forum, 2018(16):272-273.
- [5] Zhang Suhua, Chen Ping, Zhan Huan. Practice of hybrid teaching process of "Probability Theory and Mathematical Statistics" in the context of the "Internet+" era [J]. Information Systems Engineering, 2021(5):169-170.

- [6] Meng Ke, Zhao Zhong. Research on the hybrid teaching model of probability theory and mathematical statistics in the context of the information age [J]. Science and Technology Vision, 2021(34):112-113.
- [7] Sna. Research on the application of SPSS software in the course teaching of "Probability Theory and Mathematical Statistics" [J]. Journal of Lanzhou University of Arts and Sciences (Natural Science Edition), 2012, 26(6):105-107.
- [8] Yang Guan. Case design of MATLAB in the course of probability theory and mathematical statistics[J]. Journal of Southwest Forestry University (Social Science Edition), 2018, 2(1):93-96.
- [9] Zhao Xiuju. Construction of "Golden Course" in Probability Theory and Mathematical Statistics and Teaching Reform—Exploration and Practice of Online and Offline Mixed Teaching Models [J]. Science and Technology Vision, 2021(25):85-86.
- [10] Xu Er, Zhao Lutao, Li Na, Zhang Zhigang, Fan Yumei. Construction of "Golden Courses" and teaching reform of probability theory and mathematical statistics - Exploration and practice of a hybrid teaching model based on MOOC [J]. Higher Science Education, 2020(2):116-123.
- [11] Song Chao, Liu Jianxin. Research on the school-based mixed teaching practice of probability theory and mathematical statistics under the concept of "less teaching and more learning" [J]. Journal of Higher Teaching, 2024(24):44-47+52.
- [12] Tian Donghong, Li Lingna, Xie Xiangjun. Teaching reform and practice of mathematics courses under the background of first-class professional construction—taking "Probability Theory and Mathematical Statistics" as an example [J]. Education and Teaching Forum, 2023(39):57-60.
- [13] Zhang Lijing, Zhao Lutao, Li Na. Ideological and political construction and practice of probability theory and mathematical statistics courses based on dialectics of materialism [J]. University Mathematics, 2022, 38(2): 116-123.