Research and Practice on the Reform of Postgraduate Teaching Mode Guided by Cultivating Compound and Applied Talents------Taking mathematical statistics for example

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Abstract: This paper takes improving the teaching quality of graduate education as the guide. To improve graduates' ability of solving problems in life by using mathematical statistics and statistical software, the deficiencies of mathematical statistics in teaching process, and the causes of these deficiencies are analyzed in depth, in terms of teaching philosophy, teaching content, teaching methods, teaching means, and evaluation methods. Then some solutions to change this situation are discussed, as well as the problems that we need to be concerned in the process of reform.

1. Introduction
Based on probability theory, Mathematical Statistics mainly studies how to use random data to study random the regularity of phenomena effectively. Mathematical Statistics has been widely used in our life. As the basic course of master's degree in universities, Mathematical Statistics is one of the difficult courses. But it is not only the foundation of many courses, but also the important mathematical tool widely used for masters of engineering. However, in the process of learning, many students feel that the concept is abstract, the content of the course is difficult to understand, and it is difficult to combine theory with practice. Therefore, how to improve the teaching quality of mathematical statistics, how to enhance students' learning enthusiasm, how to increase students' statistical thinking, and how to make students combine what they have learned with the increasingly developed science and technology has become the most important to improve the quality of class-teaching.

2. First, it is necessary to reform the teaching of mathematics statistics.
The progress of society and the development of science and technology put forward higher requirements for the cultivation of talents under the new situation. In July 2020, General Secretary Xi Jinping stressed at the National Graduate Education Conference that graduate education plays an important role in cultivating innovative talents and improving innovation ability[1]. For the past few years, some famous universities in China have realized the significance of the curriculum construction and teaching reform of graduate students' Mathematical Statistics.

They have been carried out the exploration and practice of curriculum construction and teaching mode reform according to their own school running ideas and specific school conditions. Tsinghua University issued "Some Opinions on Further Deepening the Reform of Graduate Education in the
New Stage of Development. Which pointed out that it is the fundamental task to foster virtue through education, and it is important to promote the ability to cultivate high-level and innovative talents with both political integrity and professional competence. In Tianjin University, they take innovation ability as an important index to measure the quality of graduate students with the purpose of training higher-level talents with patriotism, creative spirit and practice ability. Yan Chunhua, who is the president of Lanzhou University, points out that improving the quality of graduate education is the most important by cultivating high-level talents with scientific research ability and innovation ability. The practice of these colleges emphasizes the teaching idea of "strengthening foundation, emphasizing application and attaching importance to innovation" in the teaching reform of graduate students. As a basic course of mathematics, it is indispensable to reform the teaching mode of mathematical statistics.

The disadvantages of the traditional teaching mode are beginning to show. In the traditional teaching mode, students feel difficult to learn, they think that mathematical statistics is too abstract, too boring, and too difficult to understand. They think that learning mathematical statistics is useless to our life. Their goal is only to pass the examination, but not to master skills and improve their ability. The students' motivation in learning is seriously insufficient, which will inevitably lead to the loss of learning interest and the lack of autonomous learning ability, which seriously affects the effect of teaching in the classroom. On the other hand, teachers feel tired in class. Day after day, teachers lose their passion for teaching. They are unwilling to be open to new things, as well as trying new things. The teachers have no sense of achievement, and the class is lack of vitality. All of these things suggest that there are many defects of the mode of mathematical statistics in the teaching process.

2.1. The teaching concepts are lack of openness.

The most distinctive feature of the traditional teaching mode is that it pays more attention to teaching than learning. They pay attention to emphasize the guiding role of teachers, rather than the leading role of the students. They only pay attention to what teachers say, instead of concerning what students learn. There is little connection between teaching and learning, which will inevitably lead to low efficiency of teaching in classroom.

2.2. The teaching content is lack of the times and professionalism.

It is the basic guarantee to improve teaching quality by selecting teaching content reasonably. In the traditional teaching mode, teachers only pay attention to the strictness and integrity of derivation, as well as the improvement of students' logical thinking ability, but ignore the practicability of mathematical statistics. They do not put focus on the practical ability and the operational ability. On the other hand, at the present stage, the teaching cases of graduate students' mathematical statistics course are old, which cannot keep up with times. The hot topics and frontier knowledge hardly ever appeared in classroom, which is not suitable for the rapid development of science and technology.

2.3. The teaching methods is lack of interactivity.

Both teachers and students are used to the single classroom teaching mode in which teachers actively "inculcate" students' passive "swallowing". Students rarely participate in classroom activities. Teachers have high authority, students do not have the opportunity to think and question, which is not good for improving the ability of independent learning.

2.4. The teaching process is lack of subjectivity.

In the classroom, it is not easy for teachers to pay attention to all students. Under this restriction, students often cannot show their original opinions and their achievements. The main position of students cannot be reflected, which is not conducive to autonomous learning.

2.5. The teaching means are lack of efficiency.

Under the traditional teaching mode, teachers and students can only carry out teaching activities in a single way at a fixed time and in a fixed place, which is lack of efficiency. However, due to the
limitation of time and space, teachers cannot take into account everyone's feelings, which will lead some students to keep up with the rhythm and seriously dampen the self-confidence and enthusiasm of poor students. Teaching efficiency is not high and teaching effect is not good. It is not conducive to the common progress of the whole class.

2.6. The teaching evaluation method is too single.
The teaching evaluation method is an essential link in the teaching process of any course. It is an important index to detect students' learning situation and teaching quality in classroom. In the traditional teaching mode, Students are evaluated by their grades. In order to cope with the examination, students spend a lot of time on the memory of concepts and formulas. But they do not know where and how concepts, formulas come from. They also do not know how to solve problems with these new knowledges, which seriously hinders the ability of students to combine theory with practice and the innovation ability.

The problems in the traditional teaching mode show that the advantages of mathematical statistics are not reflected, in terms of fostering virtue through education, cultivating mathematical thinking ability and cultivating innovative ability. The existence of these problems directly affects the quality of graduate talent training. Therefore, it is worthy of reaching how to better optimize and reconstruct the knowledge system of this course, how to innovate and carry out the reform of teaching mode and method.

3. Second, the way of teaching reform of mathematical statistics course for graduate students.

3.1. New idea.
Change the mode with teacher as the main body, but put the students in the most important position. We should pay attention to what the students have learned in classroom. To construct a learning community of "student-oriented, teacher-assisted ", teachers should not only explain theoretical knowledge as students' guides, but also as students' listeners and motivators. Students are not only receives and listeners, but also questioners. So that students can discover knowledge in research and practice, which create a “research-oriented” teaching mode that follows the law of human cognition and knowledge discovery.

3.2. New contents.
The basis of teaching reform of mathematical statistics is the change of content. In order to respond to the new engineering background," build gold course to eliminate water course ", we should update and optimize the combination of curriculum content, reorganize and supplement the existing content. We should emphasizes the design of teaching links to carry out practical exploration and research discussion, so that students' mathematical quality and application ability can meet the needs of modern scientific research.

The new teaching content should reflect the ideology and keep up with the times. We should reasonable arrangement of teaching content. On the basis of mastering basic knowledge, mathematical concepts and mathematical derivation, the application of mutual integration is realized.

Take the basic teaching content as the center, dig the curriculum depth, expand the curriculum breadth.
In May 2018, General Secretary Xi Jinping stressed at a forum between teachers and students at Peking University that education is national and education is strong. The university is the place of cultivating talents by virtue, and the cultivation of talents must be a unified process of educating people and cultivating talents\cite{4}. In the course of teaching, the "moral education"\cite{5} is permeated into the teaching process, knowledge imparting and value guidance are combined. The content is taken as the carrier, the ideological and political elements in the course of mathematical statistics are deeply excavated, and the humanistic spirit is interpreted with the help of historical allusions, famous quotes, statistical history, statistical culture, so that students can feel the beauty of mathematics unconsciously. Thus students' sense of responsibility and patriotism are stimulated.

In the other hand, we should pay attention to the application of statistical knowledge and increase data processing\cite{6}. Increasing the academic foreland into the classroom to train graduates' research capability. In order to further deepen the understanding of what they have learned, students should not only understand why we use it in this way, but also learn how to use it. They should solve the related problems encountered in practice by using the knowledge they have learned. Statistical software should be studied by students. Teachers should explain the use of statistical software to analyze problems and deal with data. At last the integration of mathematical modeling ideas should be introduced to enable students to discover knowledge in research and practice. So that they can understand the application of statistical knowledge in various professional fields.

3.3. New methods.
Teachers should change the traditional teaching mode. In terms of the methods, they can use problem-based traction teaching method, discussion method, case-based teaching method and so on. Before the class, the problems are appeared by cases, in teaching, using different methods for different knowledge; After class, cultivating ability in the process of inquiry from discovery to solution should be emphasized.

3.4. New ways.
With the rapid development of science and technology, the network resources are more and more abundant, and the means of acquiring knowledge are more and more. The new teaching mode, such as flipping classroom and admiration class, has injected new vitality into the teaching activities. Compared with the traditional mode, online teaching has the advantage of high efficiency. Students can use fragment time to learn anytime and anywhere, they can learn repeatedly that they do not understand. However, there are not any other teaching methods that can be replaced by traditional teaching methods. To improve the teaching effect, Teachers should organically combine the advantages of traditional teaching with new teaching means and the advantages of network teaching. By means of the teaching platform, teachers can publish learning materials before class, arrange
pre-class preparation assignments, set up discussion areas. In this way, teachers only need to focus on the difficulties and problems raised before class, so as to improve the efficiency and effectiveness of teaching in classroom.

3.5. New teaching evaluation.
In order to cultivate the research, applied and innovative talents adapted to the contemporary society, it is particularly important to develop the ability of operation and the ability of combining theory and practice of students.

Therefore, it is necessary to establish a new standard of learning quality assessment in order to enhance students' interest in learning and take increasing students' practical ability and application ability into account. The examination method should reflect the importance of applying learning to practical use. Link the theoretical examination with the completion of the usual homework, and narrow the gap between the theoretical examination and the usual results. It is advisable to take the theoretical examination as the proportion of 60% and the peacetime score of 40%. The theoretical examination mainly tests the students' mastery of basic concepts, basic knowledge and basic theory. On the other side, students' performance at class is divided into two aspects: normal performance and homework completion. Daily performance includes attendance, completion and participation of online and offline job. For different chapters, teachers design different types of experiments for students, and students are required to deal with the data by using statistical software. The best experimental program can be shared in the classroom. Finally, students are required to write the application of mathematical statistics in their major and the experience of learning mathematical statistics. It is the only way for students to mobilize their subjective initiative by diversified assessment methods, thus students' statistical thinking ability and the ability to apply what they have learned can be improved.

Knowledge transfer is the most fundamental foothold of any kind of teaching activity. The reform in any way should take the realization of teaching goal as the basic goal. And the same reform method can’t be applied to all courses. Therefore, the feasibility and effectiveness of the reform should be ensured based on learning conditions and course features.

4. Conclusion
With the rapid development of the new technological revolution, mathematical statistics has developed into a wide and common technical means in the traditional fields of military, engineering, medical and other natural sciences. It has become an important tool for the analysis of new information by mathematical methods, and the breadth and depth of mathematical statistics applying to the practical problems are still expanding rapidly. As a graduate student in engineering colleges, it is important to absorb and master the knowledge in book, but more significant than that, graduates' ability of applying the knowledge to practice is noteworthy. So how to improve the ability is an important educational theories and practical topics that need to be solved urgently in front of us, which is worthy of our continuous exploration and research.
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