

Exploration of the Teaching of Experimental Design Course

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Abstract

In order to improve the quality of higher education and teaching, higher education courses requires the perpetual reform, which can make the higher education courses follow the frontier development of discipline and keep on the times. Based on using appropriate teaching material, stimulating students' interest, training the quality of teachers, improving teaching methods, teaching methods and other aspects, this paper proposes some suggestions for experimental design course to improve teaching means and methods, which can enable students to improve the learning interest, deepen the understanding of theoretical knowledge, and through a variety of ways to eventually reach the goal of mastering the course, laid a solid foundation for the future study and work.

Keywords: *Experimental Design; Teaching Reform; Classroom Teaching; Teaching Method; Teaching Quality*

1 INTRODUCTION

Experiment optimization technology is a basic tool of mathematics. It is a theory, technology or science that is based on different goodness, reasonably designing test plan, controlling experimental interference effectively, dealing with test data scientifically, optimizing and analyzing comprehensively, and directly realizing optimization target (Ren, 2009). The experiment optimization runs through the whole process of design, implementation and data processing of the test. It plays an extremely important role in the fields of scientific research and enterprise production in universities. The test optimization technology can greatly reduce the cost of manpower, material and test time, and can improve the accuracy of the test results.

Experimental design course combines theory with practice and is very practical. It must progress with the progress of the times (Chen, 1996; Fang & Liu, 2012; Zhou, Lai & Liu, 2010). In recent years, with the deepening of theoretical and technological research and the emergence of applied results, the new technologies and methods of experimental optimization are constantly showing up. We need to reform the course of experimental design to better meet the needs of the times. In addition, with the rapid development of society, changes in college training objectives, professional talents to meet the needs of high quality and high quality in twenty-first century, changing the training goals of colleges and universities by cultivating knowledge talents gradually to cultivate innovation and ability and operating personnel, led by teachers to students' autonomous learning students have learn to change (Chen & Huang, 2004; Shi, Qu, Qian, Wang & Chen, 2016; Wan, 2012), while the change of teaching objectives will inevitably lead to the changes in the teaching content of the experimental design course. At present, due to the development of the information age, a large number of new theories and new methods are rapidly expanding, which require us to digest and absorb in the classroom. Because the students have limited energy, integrity and some teachers only emphasize the curriculum, ignoring students' ability to accept, to little effect; some teachers just take effect and ignore the integrity of the courses, leading the students' knowledge is very limited, therefore, there is more content and less hours of conflict. In addition, the course has many characteristics, such as many formulas, many deduces, many calculations, and many forms, which determine the complexity of the course itself (Li, Wang & Zhan, 2013; Miao, Liu, Gou, Wu & Lu, 2012). This is in conflict with the actual situation of less hours, so we need to carry out the

reform of our teaching.

2 ADOPTING SUITABLE MATERIALS TO PROMOTE THE REFORM OF TEACHING

At present, various version teaching materials of experimental design continue to emerge, however, the appropriate teaching materials are very few for students in school. Therefore, teachers should choose a suitable teaching material of experimental design. The selected teaching materials generally should focus on the following characteristics. Firstly, the teaching material should pay attention to the infiltration of experimental ideas, strengthen the practical application, prevent the tendency of heavy base light applications and heavy theory light calculation of the traditional teaching materials. Examples and exercises are selected directly from real life, which can not only deepen understanding of the basic concepts and methods, but also improve the students' learning interest. Secondly, the exercises are arranged, the exercises are equipped in each section, each chapter has two sets of exercise A and B. In addition, basic exercises are used to deepen the understanding of basic concepts and methods. The individual comprehensive skills, and strong application exercises also are also listed to meet the needs of students at different levels. Teachers should make teaching materials easy to use. Another feature is the special emphasis on the use of software. At the end of the textbook, SAS software should be introduced and applied. Relative to simplicity or practicality, we should introduce the application of Excel and SPSS software in the test design. Through the operation of students, we can understand the powerful function of software and train students' practical ability.

3 STIMULATING STUDENTS' INTEREST TO IMPROVE CLASSROOM EFFICIENCY

"Love is the best teacher". To make students deeply love experimental design from the absolutely ignorant for the course, teachers should tightly peg to the students' excitement, so that students have a strong interest in the tireless. To this end, based on the understanding the contents and researching teaching method, teachers should pay attention to arouse students' interest by using the background knowledge of experimental design and adopting the teper humorous language in teaching. (1) Case method, (2) Historical method, (3) Realistic method, (4) Interest method, (5) Additive scoring method. In order to encourage students to speak, teachers should point out that students always be added points regardless of the correct or wrong. Even students answer wrong, teachers should give them extra points. In addition, for some outstanding students, teachers should encourage them to learn from their own ahead of time. Then, let them write a lecture. Finally, let them speak to students, and answer the questions of students. Of course, the score is not the purpose of learning, teachers should just hope that using this means encourage students to dare to speak. At the same time, it can provide a free academic world for students. In order to cultivate students' innovative ability, teachers should start from the management method. In classroom, to build an innovation environment, teachers should encourage students to find new thinking to develop critical spirit. Accordingly, students can interest to study in classroom. Some students maybe do not care about real points or not. Some students even take the initiative to ask for extra points, and they hope to take their own strength to participate in the final exam. These phenomena indicate that students are not only the pursuit of score, they pay more attention to improve the ability.

4 STRENGTHENING COMPREHENSIVE QUALITY OF TEACHERS TO IMPROVE QUALITY OF TEACHING

In modern teaching mode, teachers are not only the imparting knowledge but also the organizers of teaching activities, playing a leading role in the teaching process. The overall quality of teachers is directly related to the effectiveness of teaching. The teaching of experimental design course requires teachers to have a solid foundation of higher mathematics, probability theory, mathematical statistics and linear algebra as well as strong logical thinking ability while the course is closely related to scientific research and production practice. With the development of computer science, all kinds of statistical analysis software related to this course have been developed and applied. This determines that the theoretical system, teaching methods and learning methods of this course are different from other courses, requiring teachers to have higher theoretical level and scientific research practice ability. In order to teach this course well, teachers must work hard to improve their comprehensive quality. First of all, teachers should keep pace with the times, change teaching concepts, strive to study the rules of education and teaching, explore the teaching content system suitable for the development of science and technology, and establish corresponding

teaching means and teaching methods. In the teaching process, teachers should be the quality education and the training of application ability as the primary goal, carefully study the characteristics of the course teaching of specialty and the students, teaching in accordance with the cognitive law of teaching and students, teachers should play a leading role in the teaching process and the main role of students. Second, teachers should delve into the teaching contents, the theory and the knowledge system of the discipline system to grasp and mastery; at the same time, closely follow the trend of the development of the discipline, learning new things to master the theory and method of statistics and statistical analysis of various modern new software applications, constantly improve the teaching content. This requires teachers to spend a lot of time in teaching, improve their knowledge structure, pay close attention to the latest development trend of disciplines, and constantly improve their theoretical level. Third, teachers should continue to improve their scientific research quality and professional practice ability. In the course of teaching, teachers can run through the research work and production practice in the professional field to the teaching content, which can talk about the taste of this course, increase students' interest in learning, train students' statistical thinking quality and the ability of practical application to statistics. Otherwise, the "taste" of mathematics will be too strong, and it can't get the teaching effect. Therefore, teachers must actively devote themselves to scientific research and promote the teaching of this course through sublimation of scientific research and professional practice.

5 USING MULTIMEDIA TEACHING TO IMPROVE THE VIVID IMAGE UNDERSTANDING

The extensive use of computer assisted instruction has caused great changes in teaching, and also makes the teaching content of the new changes. It has injected new vigor and vitality into the traditional education and teaching mode. Compared with the traditional teaching, computer assisted teaching or multimedia teaching has incomparable advantages. It can not only save a lot of writing time to increase classroom information, and can make rich the process of teaching to active classroom atmosphere to improve teaching effect. At the same time, using multimedia teaching means can change the random problem into a mathematical problem to establish good foundation for students engaged in the future research of economic, life science, material science, artificial intelligence and other. The multimedia teaching should be used appropriately according to the teaching content. However, the multimedia can't abuse and misuse, and can never put the lesson plans, related formula and the results directly copied. Teachers need to pay a lot of effort to make a good teaching courseware to fit for students according the characteristics of the teaching content and students' acceptance degree. Therefore, the multimedia teaching and the traditional teaching mode should be organically combined to complement each other to work together to serve the teaching.

6 REFORMING STRUCTURE OF TEACHING TO CULTIVATE ABILITY OF INNOVATION

The teaching structure refers to in certain education thought, teaching theory and learning under the guidance of the theory, form a stable structure in an environment to carry out teaching activities, it is the embodiment of teaching thought, teaching theory, learning theory, mainly refers to the combination of teachers and students, teaching materials and media of 4 basic elements. The structure of teaching is the traditional teacher centered teaching structure, the teacher is the absolute leader, teaching result, teaching methods, teaching methods and teaching contents of all are serving teachers, tend to ignore the students' creative ability, repressed the growth of innovating talents. The reform direction of the teaching structure must be centered on the students. Students are the main body of learning and information processing. Teachers are the help and facilitators of students' learning, and provide guidance and feedback for students only when necessary. The group members in the teaching environment, give full play to the multimedia computer interaction and network flexibility and other characteristics, actively mobilize students' enthusiasm and initiative; on teaching resources, to provide students convenience of network teaching platform, a large number of teaching materials and related information, the ability to actively cultivate students' autonomous learning and self-development; In the teaching mode, we should follow the "purposeful learning" mode guided by the teacher and students as the main body, that is, teachers should point out the learning objectives, and learn by themselves, and when teachers encounter problems, the teachers and students will coordinate the problem-solving learning methods. A comprehensive evaluation system of students' whole process learning effect combined with classroom, out of court experiment, regular homework, irregular classroom discussion and final examination is also included in the assessment methods. The comprehensive evaluation system can make a comprehensive

evaluation of students from the aspects of learning awareness, learning attitude, learning method and learning effect. In addition, the research group can encourage students to design independently and give some extra points to cultivate students' innovative thinking, so that students can solve problems independently innovation ability.

7 USING NORMAL AND TEST RESULTS TO ESTABLISH A REASONABLE ASSESSMENT MECHANISM

Examination is an important part of teaching activities. A reasonable assessment method has a guiding and promoting role for students to consolidate their contents and flexibly apply statistical analysis methods. At the same time, the examination is also an important way to feedback the problems in the teaching. The traditional way of examination is mostly closed book test. The examination content mainly focuses on the examination of theoretical knowledge and basic statistical methods. The achievement of this course is mainly determined by the final exam results. This determines that before the final examination, the students have to review and memorize the exam. The result is that students will soon forget their contents after exams, which is very unfavorable for the practical experiment design, which is not conducive to the examination. The examination has the function of the baton in the course of teaching. For this reason, the author has carried on the reform and exploration to the examination method in the practice. In the teaching practice, the author divides the total score of the students into two parts, that is, the results of the ordinary and the final exam. Usually the result is generally accounted for the final score of 30% courses, mainly to assess homework, according to the usual classroom questions, without prior notice of the quiz, exam and experimental courses in the period of performance. The final written test scores accounted for 70%. The examination content was mainly about the flexible application ability of students' basic knowledge and the ability to solve practical problems by statistical analysis. By adopting this way of examination, students' learning energy can be used in peacetime and guide students to focus on the comprehensive and practical application of knowledge in the course of learning.

8 CONCLUSION

In the teaching for the course of experimental design, teachers should change the traditional teaching methods. How to reform and improve the teaching modes and methods to enhance the quality of teaching to enable students to understand the basic idea of experimental design, grasp the experimental design inference skills, improve the ability to analyze and solve problems. These are questions that the teachers of experimental design course should still think about.

ACKNOWLEDGMENT

This work is supported by the Teaching Research Project of Xi'an University of Technology under Grant Nos. xjy1766 and xjy1720 and the Shaanxi province higher education teaching reform research project under Grant No. xjy17BY031.

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