

# Reform of Teaching Mode of Introduction to Statistics

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## Abstract

Statistics is an independent subject set up by many colleges and universities to conform to the development of the times. Teachers should pay more attention to the students' professional foundation in the teaching process, and introduction to statistics is one of the required courses to lay a good foundation. Because computer technology plays a major role in modern teaching mode, so does the education of introduction to statistics. Therefore, the combination of modern technology in teaching is conducive to the development of teachers' work, and will greatly improve the teaching effect. This paper analyzes the reform of the teaching mode of introduction to statistics for teachers to achieve good teaching effect in practical teaching.

## Keywords

Modern Technology; Introduction to Statistics; Teaching Mode.

## 1. Introduction

Statistics is a comprehensive science that uses various means such as searching, sorting and analyzing data to analyze the essence of the research object, or to predict the future through data. Therefore, with the development of the times, the emergence of big data provides great convenience for statistical research. At the same time, big data has also provided a lot of contributions to all walks of life, which has gradually become a subject closely related to data. Some people think that data science is the intersection of statistics and computer science. Indeed, statistical methods and techniques are inseparable from the assistance of computer technology. At present, the society has a large number of cases beyond the traditional amount of data, but as long as you master the knowledge and skills of statistics, the difficulty of data processing will be greatly reduced.

## 2. The Basic Idea of Teaching Reform

Taking a panoramic view of the application-oriented majors in contemporary China, applied statistics is the first to bear the brunt. In today's era, students learning applied statistics should have the ability to skillfully master software applications, which will help students understand and use big data, so as to explore the valuable things in technological development, administrative management and life production. Therefore, understanding the application of software and computer is a necessary requirement for students to learn statistical knowledge. At present, the requirements for undergraduate students of statistics in China are as follows: first, students of this major should lay a good foundation in mathematics, cultivate students' computer and programming ability, and make them master database and statistical software. Secondly, in the process of statistical education, screening real data is extremely important; thirdly, teachers should show students more diversified statistical methods and models in the teaching process; finally, students' ability to express data analysis in the form of charts, language or animation should be cultivated.

With the rapid development of science and technology, the teaching method combined with computer has become the teaching mode of contemporary statistics. Because the teaching mode can not only make students get more data application experience, but also strengthen students' understanding of statistics in application. As the core course of statistics major, introduction to statistics is the basis for students to learn other statistical knowledge. Through the explanation of "Introduction to statistics", teachers can make students establish a good statistical thinking and build a correct knowledge system.

In the process of teaching, teachers should accurately judge students' learning quality and learning ability, and use modern science and technology to enhance students' understanding of knowledge and cultivate students' application ability.

### **3. On the Teaching Mode of Introduction to Statistics**

#### **3.1. The Necessity of Introduction to Statistics**

At present, there are many versions of the introduction to statistics in the market, but most of these books are based on the overview of the four-year learning content of statistics major, and each chapter in the book is a kind of professional course in the future study, so is it necessary for schools to open the introduction to statistics. Through investigation and research, most teachers and scholars think it is necessary, and the opening time is the next semester of the freshman year, because students have gradually adapted to the learning rhythm of the school after entering the first semester, which enables students to fully understand the learning process of the next four years in the course of statistical theory, and also enables teachers to grasp the teaching progress well.

#### **3.2. Class Hour Design of Introduction to Statistics**

According to the survey, most schools set the opening time of introduction to statistics as the first semester of the freshman year, from the fourth week to the eleventh week, a total of eight weeks, once a week, two hours each time, a semester of 16 hours. This way can not only introduce the learning content and development process of statistics to students macroscopically, but also allow teachers to provide learning suggestions to students for their future learning development. Because the content of the class is relatively basic, so the class hours should not be too many. 16 class hours is just right, which not only increases the students' understanding of the major, but also increases the time for other public courses.

#### **3.3. How Software Processes Data in the Course of Introduction to Statistics**

When teaching introduction to statistics, teachers can show students how to use one or two statistical software, so that students can practice, master the production method of theoretical data in statistical software, and basic knowledge of statistics, lay a good foundation of statistics theory, and fully apply the actual data in life and scientific research to the course learning.

#### **3.4. Find out the Causes of Students' Learning Difficulties**

In order to solve this situation, teachers should explain the examples that people come into contact with in detail, and carefully guide students to get the solution steps, so that they can skillfully use statistical thinking and software practice. At the same time, teachers should actively encourage students to strengthen their self-confidence and interest in the major.

### **4. Practice of Teaching Reform**

Introduction to statistics is an important basic course for students to learn statistics. It includes the basic theory of statistics and some teaching contents of data processing methods. It is a

necessary course for students to understand the professional courses of statistics. With the continuous reform of education, the curriculum should also focus on the following aspects:

#### **4.1. Optimize the Teaching Content and Strengthen the Cultivation of Practical Ability**

First of all, teachers should choose teaching software suitable for students' learning. As we all know, the relationship between statistics and mathematics is inseparable. In the development of modern society, the use of computer programming to solve some data problems has become a generally accepted development trend. R software is widely used in the field of statistics. It was developed by Robert Gentleman and Ross Ihaka in 1980. It is a branch of S language. Because R is a free software, many volunteers are willing to actively join, especially in today's era of big data development, R has become a data analysis software that most industries are keen to use with its own advantages. In addition, R software also has a very important feature, that is, the introduction is very simple. Under the guidance of teachers, students have no difficulty in mastering some basic programming.

Secondly, teachers should find teaching methods to strengthen students' ability to preprocess real data. The data structure produced in real life is very different from the knowledge in textbooks. Because the textbook needs a certain degree of rigor, the data form in the textbook is formed after processing, which is why students feel the difference between the knowledge learned in the textbook and the actual situation. Therefore, when imparting knowledge to students, teachers should spread out the knowledge points in the course, so that some basic statistical methods and programming techniques in R software can be synchronized with the knowledge points in the course.

Finally, teachers should increase the teaching mode of case teaching and encourage students to participate independently. Because each chapter of introduction to statistics is for students to be able to apply the knowledge background of skills, it is very suitable to carry out a variety of case teaching. At present, there are a lot of practical cases in foreign statistical textbooks, but there are few cases in domestic textbooks. Therefore, statistics teachers in China can establish a professional database based on their own years of teaching experience and social experience to add rich case data to the teaching work of Statistics Department.

#### **4.2. Highlight the Cultivation of Modern Statistical Ability**

First of all, teachers train students' statistical thinking. With the continuous progress of science and technology, contemporary statistics has an inseparable relationship with computer technology. Whether the staff collect data, organize data or analyze data, they all rely on the support of computer software. Therefore, undergraduates majoring in statistics should establish modern statistical thinking, form modern statistical thinking, explore and analyze the case data by using application software, so as to form a statistical model and display the results. Secondly, teachers should urge students to form a good habit of using statistical software. In the learning process, students should skillfully use the software displayed by teachers, explore and analyze the data, carefully find and clean the errors in the data, form good programming ability and algorithmic thinking, and can skillfully operate the data. For example, to meet the needs of research, students should integrate data from different sources and formats accurately and skillfully. In addition, in order for students to carry out simulation research smoothly, teachers should urge students to fully master computer technology. Only in this way can students learn efficiently.

Finally, teachers should cultivate the expression ability of students majoring in statistics. Students have good communication and expression, and can explain the data analysis to the audience smoothly by means of graphics and animation. In addition, good expression plays an important role in cultivating students' leadership ability and the spirit of unity and cooperation.

If a statistician wants to effectively convey a data conclusion without error analysis, it is inseparable from the combination of expression ability and statistical technology. Therefore, the expression ability of students is particularly important for students majoring in statistics.

### **4.3. Reform the Teaching Mode of the Course and Stimulate Students' Interest in Learning**

First of all, we should build a teaching program of R software for beginners. After the teacher shows the software and knowledge to the students, the students are curious and challenging about the unknown things, which greatly stimulates the students' interest in learning. Introduction to statistics is the core course for freshmen, which is particularly important for the next three years. At present, there is no programming textbook written in combination with students' actual situation in China. Therefore, teachers can compile a set of handouts for students' introduction to R software according to students' learning situation and the basic content of the textbook, and explain them through the handouts, so that students can practice.

Secondly, according to the current situation of students, the software of course knowledge points is designed and displayed. In the design process, teachers should fully consider the students' mastery of knowledge points, especially the key and difficult points in statistics. Through software simulation, students' understanding of the content will be enhanced, making it more convincing. At the same time, the display of each knowledge point is a very basic work. Teachers should design carefully to make students get twice the result with half the effort.

Thirdly, teachers can write reports instead of exams. It is very important for professional data analysts to ensure the correctness and standardization of statistical reports, so students majoring in statistics should not only lay a good professional foundation, but also cultivate the ability of language expression, and convey data analysis in an easy to understand way. Its communication methods mainly include: oral and written expression ability, communication ability with users, team cooperation ability, etc. Standardized writing of statistical reports will cultivate students to pay more attention to data quality, so as to cultivate students' habit of using more scientific methods to analyze reports objectively.

Finally, teachers should assess the students' learning situation at this stage. Among them, the forms of assessment should be diversified, because it can assess and analyze the students' learning situation from different levels. Such as students' programming ability, expression ability, etc. Because students are good at different aspects, this assessment method will make students recognize their strengths and weaknesses earlier, and make students more purposeful in their career choice. In the process of examination, teachers should avoid the mechanical knowledge point investigation, and should combine the actual data with the students' learning content to assess the students. In addition, after investigating the students, the teachers analyze the students' scores of knowledge test and data analysis report. Due to the different assessment methods, teachers use different assessment standards to analyze students' mastery of knowledge. Its main purpose is to carry out hierarchical clustering through the situation of students, so as to focus on teaching.

## **5. Conclusion**

Introduction to statistics is a professional course knowledge that students first contact in the four years of University. Because it is an era of computer, big data and statistics, teachers should research and explore the traditional teaching methods and improve their deficiencies. In the process of teaching, students should establish a modern statistical thinking, form a good habit of using software, and gradually improve their ability of writing reports. For schools, we should pay attention to the teaching resources and teachers in the software driven teaching mode, so as to make it more abundant. Only in this way can China keep pace with the development of the

times in the development of the new era, and move forward in the emerging challenges and opportunities.

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