A panoramic view of the Shanghai skyline at sunset, featuring the Oriental Pearl Tower and the Shanghai Tower. The sun is low on the horizon, casting a golden glow over the city and the water.

Introduction to Statistical Contents of Mathematics Curriculum in Shanghai

Huang Hua

1. Introduction

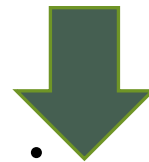
Statistical contents in mathematics curriculum of primary schools, middle schools and high schools in Shanghai, China.

(1) The school system

The school system is 5, 3 and 4 in Shanghai

Grade 1-Grade 5 in primary school

No Entrance Examination



• **Grade 6-Grade 9** in middle school

Entrance Examination



• **Grade 10-Grade 12** in high school

Entrance Examination



(2)The reform of mathematics curriculum

The reform of mathematics curriculum in Shanghai has gone through 30 years, which has achieved great success. However, there are still some problems in statistics teaching.

Statistical contents in mathematics curriculum of primary schools, middle schools and high schools in Shanghai **is as follows:**

In primary school

统计表初步

条形统计图（一） 2（1）

条形统计图（二） 3（2）

折线统计图的认识

折线统计图的画法 4（2）

平均数

平均数的计算

平均数的应用 5（1）

Preliminary statistical table

Bar graph (Chart) 1

Bar graph (Chart) 2

Understanding of line graph

Drawing of line graph

Mean

Computation of mean

Application of mean

In middle school

初步

第一节 统计的意义

The Significance of Statistics

28.1 数据整理与表示

Data Arrangement and Representation

28.2 统计的意义

The Significance of Statistics

第二节 基本的统计量

Basic Statistic

28.3 表示一组数据平均水平的量

Quantity representing the average level of a set of data

28.4 表示一组数据波动程度的量

Quantity representing the fluctuation level of a set o

28.5 表示一组数据分布的量

A quantity representing a set of data distributions

28.6 统计实习

本章小结

阅读材料 统计图各有奥妙

In high school

第 18 章 基本统计方法	Basic statistical methods
18.1 总体和样本	Population and sample
18.2 抽样技术	Sampling technique
阅读材料	Statistical estimation
18.3 统计估计	Statistical estimation
18.4 实例分析	Analysis of examples

**Every student has to learn these statistical contents.
Every student needs to learn these contents and use a
unified textbook.**

2. Characteristics and problems

1. Primary, middle and high schools statistics courses have a small proportion of teaching hours: 15 teaching hours/525m, 10 teaching hours, and 10 teaching hours/400m, respectively.
2. All teachers are graduates from the Department of Mathematics instead of Department of Statistics. They pay more attention to how to teach mathematics.

3. Teachers pay attention to the deduction of calculating formulas and teach statistics as mere operations.

4. There are limited examples, and students have few opportunities to use statistical thinking to solve problems.

5. There are few materials on big data to teach statistical thinking.

3. Now and the future

However, with social and economic development in recent years, more attention has been paid to the teaching of statistics.

The new standard for (senior) high school mathematics curriculum in China was officially issued in 2017. The compilation team leader is a statistician.

In this mathematics curriculum standard, six core literacy of mathematics are clearly specified, one of which is the literacy of data analysis.

Data analysis refers to the acquisition of data for the object of study, and the use of mathematical methods to collate, analyze and infer the data, so as to form the literacy of knowledge about the object of study.

Data analysis process mainly includes: collecting data, collating data, extracting information, building models, inferring, and drawing conclusions.

Data analysis is an important mathematical technology for studying random phenomena. It is the main method of mathematical application in the era of big data, and is also the main mathematical method in "Internet +" related fields. Data analysis has penetrated into all aspects of science, technology, engineering and modern social life.

Data analysis is mainly manifested in collecting and collating data, understanding and processing data, obtaining and interpreting conclusions, summarizing and forming knowledge.

Through learning high school mathematics curriculum, students can enhance their awareness and ability to acquire valuable information and conduct quantitative analysis;

adapt to the needs of digital learning,
enhance the awareness of expressing
realistic problems based on data, form
the thinking quality of understanding
things through data, and accumulate
activities experience of exploring the
essence, relevance and regularity of
things by relying on data.

Basic Course

Statistic Content

The contents include: basic ways to obtain data and related concepts, sampling, statistical charts, and estimating the population with samples.

Among the academic requirements,
there is a paragraph:

the difference between statistical thinking and deterministic thinking, the difference between inductive inference and deductive proof can be distinguished. To understand the probabilities of statistical inference results and correctly use statistical results to explain practical problems.

Selective Compulsory Course

The contents include: statistical correlation of paired data, linear regression model of one variable, 2×2 contingency table

Now we are compiling high school mathematics textbooks, which are composed of university professors and middle school teachers.

4. Statistical thinking

Statistical thinking: When facing problems, it shows a relatively stable tendency of thinking, that is to say, it can "think statistically", which includes recognizing the need for data, perceiving the ubiquitous variation in the process, describing, organizing, representing, analyzing and explaining the data;

It can synthesize information such as data and actual situation, use statistical methods to reasonably infer and make decisions, form a holistic awareness of statistical process, and have a critical awareness of process and result. (Sun Lu)

What is statistical thinking?

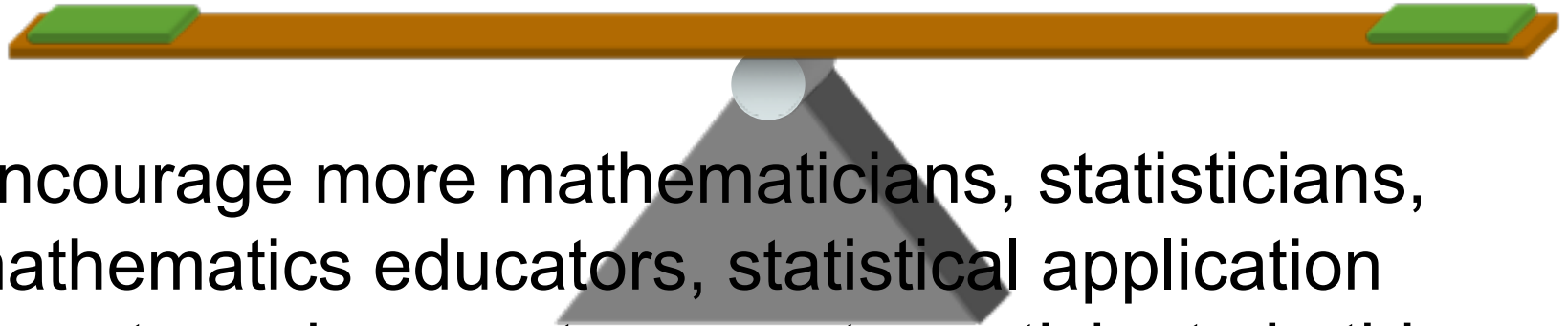
Statistical thinking is a way of understanding a complex world by describing it in relatively simple terms that nonetheless capture essential aspects of its structure, and that also provide us some idea of how uncertain we are about our knowledge. The foundations of statistical thinking come primarily from mathematics and statistics, but also from computer science, psychology, and other fields of study.

Source: <http://statsthinking21.org>

I have asked statisticians and statistic education experts who all said that there is no unified statement for statistical thinking.

5. Suggestion

With the advent of a new era, the importance of this course has not yet been recognized



Encourage more mathematicians, statisticians, mathematics educators, statistical application experts and computer experts participate in this project.

6. Challenges

Lack of curriculum structure and designers

Teachers also need to be trained

Balance the following relationships:

Basic and Development

Independent and Comprehensive Courses

Methods and Thinking

Ideals and Realities



14th International Congress on Mathematical Education

July 12 to 19, 2020 Shanghai, China



HOME

LOGIN

中文

English

Introduction

Committees

Address of Welcome

As the congress chair of ICME 14, I cordially invite



Welcome to Shanghai for the 14th ICME in 2020

icme14.org



Thank you