

Teaching Statistics at the Secondary School Level in France

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1. The ups and downs of statistics in the school academic programmes during the last ten years

In France, statistics is considered as a part of mathematics and is mainly taught by mathematics teachers, although it is often employed in various disciplines such as economics, geography, and biology.

Twenty years ago, experiments were conducted in some primary schools (children 6-11 years old), mainly under the direction of IREM (Institut de Recherche sur l'Enseignement des Mathématiques). The goal of these experiments was to expose children to random situations and to study their behaviour in such situations. Nowadays, children are supposed to deal with data organisation in the last year of primary school. But, actually, the teaching of data management depends mainly on the teacher's attitude towards statistics.

Secondary education in France is divided into two cycles: the first concerns the collège, devoted to the education of pupils who are eleven to fifteen years old, and the second concerns the lycée, for pupils fifteen to eighteen years old (see Table 1).

The national examination at the end of the third year of lycée is the baccalauréat. There is another national examination, the BEPC, which takes place at the end of the collège cycle. While the BEPC is not essential to enter the lycée, the baccalauréat is absolutely necessary to enter university.

From sixième to seconde, the mathematics programme is the same for everybody. The mathematics programmes are differentiated in première and terminale depending on the section: scientific, economic, or literary.

Ten years ago, statistics was only taught in the lycée, but because of the wide range of subjects in the mathematics programme, the teaching of statistics was discontinued in scientific sections. The changes in mathematics programmes which occurred in 1986 introduced the teaching of statistics from the first year of collège. Therefore, for the first time this year, all the children entering the lycée have, or are supposed to have, received a basic course of descriptive statistics. More and more often, statistics appears in the BEPC examination. So it is putting more pressure on teachers who must teach statistics if they want to give their students the best chances.

TABLE 1
Correspondence between the age of students and the grades in
secondary schools

	Age of pupils	Grade
Collège	11-12	sixième
	12-13	cinquième
	13-14	quatrième
	14-15	troisième
Lycée	15-16	seconde
	16-17	première
	17-18	terminale

In 1991, the teaching of statistics will be continued in seconde. But it is feared that in the future the teaching of statistics will not be a part of the programmes in the scientific sections. National programmes are elaborated by committees including teacher representatives. Most of the time there is no statistician on the committee and mathematicians have no idea of what kind of activities can be introduced in statistics classes. In the minds of some mathematicians, teaching statistics can be considered as an introduction to probability theory!

Until recently, mathematicians, and especially probabilists, were the only people in charge of statistics programmes. They were unable to disassociate statistics and probability. They totally ignored descriptive statistics (boring and time consuming), and exploratory data analysis. Two years ago, the ASU, Association pour la Statistique et ses Utilisations (Association for Statistics and its Use) which is a member of the French Statistical Society (SSF) began a survey on the teaching of statistics in France, including primary, secondary, and technical schools, and universities. The final report will be available very soon. But for the first time, it came home to statisticians that their discipline and their careers depended entirely on mathematicians and that they had to take charge of the teaching of statistics. Therefore, things are changing now.

2. Reasons for the situation of statistics teaching at secondary level

The main reason for the poor situation of statistics education at the secondary level is the lack of teacher training. Most teachers have never received any training in statistics. Despite its introduction in many university courses, statistics is too often treated as a poor relative with respect to other branches of mathematics. There are few statisticians teaching at university. Statistics is mainly taught by mathematicians. In France, the influence of pure mathematics and pure mathematicians is very strong. Academic careers are better for theoreticians.

Another reason is the lack of teaching material for secondary school teachers. They have difficulty in finding interesting examples, problems, or data. In the collège, the part dealing with statistics is called data organisation and management. In the

programmes and in student texts, the subject is always associated with the study of functions. In some books in use in collège the part devoted to statistics is reduced to a small paragraph! Fortunately, we can find a whole chapter on the subject in others. In our report, we surveyed the part devoted to statistics in books for secondary school. Some books have no figures, no data! All this can explain why teachers feel uneasy and are confused: they have no appropriate training and no appropriate educational material.

A third reproach to statistics is that it is time consuming. This is probably true, but teachers should use computers and appropriate software.

3. Actual and future developments

Some small research groups have been working on the collège programmes since 1986, in several IREMs (Research Institute on the Teaching of Mathematics). These efforts have been coordinated by a national commission. Three months ago, the association of the IREMs managers decided to create a special group working on the teaching of statistics.

Next year, the IREMs will participate in a national competition on applied and graphic statistics for collèges and lycées. This competition will be sponsored by the French Fondation : la Science Statistique (Statistical Science). The first competition started last year in the Academy of Montpellier. The winning poster was shown during the last session of the International Statistical Institute in Paris.

The actual situation is a little different for teachers in the technical sections. Many training sessions in statistics are organised for them. Technical sections are most related to industry and there is a strong need for technicians working in quality control and reliability for example.

The ASU must be a leader in the development and the improvement of statistics education. The ASU wants to be recognised as an expert group for everything concerned with the teaching of statistics:

- (i) by the Ministry of National Education for the working out of the programmes;
- (ii) by editors for the accrediting of a quality label to student texts.

In the near future, the ASU plans to issue an information letter for secondary school teachers in geography, economics, biology, and mathematics, and to provide the teachers with a data bank. It also plans to organise permanent training sessions in statistics for interested teachers. The Ministry of National Education means to develop what is called a "cross project", meaning a project which involves several disciplines: statistics and statisticians must be ready to take a large part in this work.

References

Association for Statistics and its Use (1990) *Rapport sur l'enseignement de la statistique*.
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