UPDATING TEACHING METHODS IN PROBABILITY AND STATISTICS

Session devoted to Italian school teachers

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UPDATING TEACHING METHODS IN PROBABILITY AND STATISTICS

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The session was attended by 22 teachers, mainly from secondary schools (17). The majority of the participants came from technical schools (ITC), however, teachers from secondary schools specializing in scientific studies (LS) and from industrial secondary schools (ITI) were also present.

It was to be expected that the participants came from these kinds of schools, owing to the fact that the current school legislation provides for "Probability and Statistics" to be on ITC and ITI syllabuses, however, this subject is virtually non-existent and limited to probability only in LSs, with the exception of those LSs where experimental courses have been set up, which follow the new syllabuses of the so called "Brocca Commission".

The participants came mainly from the centre of Italy, where the meeting was held (14), but also from northern and southern Italy (5 and 3 respectively). The session was also attended by a teacher from the Palermo IRRSAE (regional institute for research, experimentation and updating in education).

Upon opening the meeting, the Chair remarked that in order to be governed, an increasingly complex modern society needs increasingly complex statistical systems of information. This calls for, on the one hand, the training of experts able to contribute to the development of the systems, while on the other it demands awareness on the part of citizens, who should be able to use and interpret correctly the data they are offered. This is one of the reasons why "Probability and Statistics" is gaining ground within school syllabuses, from primary to middle and secondary schools. In order for the widening of syllabuses to become effective, however, it is first of all necessary for teachers to be adequately prepared to face their new tasks. Although no specific national survey is available, it seems reasonable to think that currently in Italy "Probability and Statistics" is taught in pre-university schools by teachers who may have studied probability and mathematical statistics, but who almost certainly did not study statistics at university and who consequently find themselves

having to tackle the subject practically on their own.

It was also to help teachers in this up-hill work that CIRDIS (Inter-university Research Centre for the Teaching of Statistics) was set up in 1991, mainly on the initiative of the Italian Statistical Society.

For IASE and CIRDIS, this session represented a focal point to establish a link between school and university.

At the moment, some topics, which are both practical and pragmatic, appear of immediate relevance.

Given that teachers have had to face and are still facing a number of difficulties in the teaching of "Probability and Statistics", a few questions come up regarding how teachers relate to the teaching of "Probability and Statistics" in schools, how they think their professional competence could be adequately developed for the future, and what links CIRDIS might be expected to provide in order to meet the needs of pre-university school teachers.

The contributions to the meeting were numerous, varied and constructive. Statistics was generally recognized as a subject playing a formative role from a cultural, social and political point of view and as basically having an interdisciplinary character (Di Pisa, IRRSAE, Palermo). It was also pointed out that, where it had been possible to direct students to carry out small-scale investigations, statistics showed its educational value by improving the students ability to analyze real-life situations and to manipulate data, and it also provided an opportunity for an immediate link with the computer science laboratory (Vitangeli, ITC, Rome).

Despite the unquestionable usefulness and validity of probability and statistics, however, their actual teaching meets with some resistance.

It was clearly pointed out that neither subject was included in the teachers' university courses of study, and that statistics appears to be more orientated towards research, including experimental research, a field with which pre-university education is only marginally if not at all concerned. Finally, it was emphasized that statistics is not an organic part of the Italian school curriculum (Di Pisa, IRRSAE, Palermo). In particular, it was noted that while on the one hand no syllabus coordination exists between the different school levels - primary school, middle school, the first two years and the second three years of secondary school - (Di Pisa, IRRSAE, Palermo), on the other hand, where "Probability and Statistics" is included in the syllabus, i.e. in technical secondary schools, some factors impair its correct teaching, namely its inclusion in the mathematics courses, the non-clear relationship between probability and statistics and the excessive number of topics dealt with (Baldoni, ITI, Gubbio).

In fact, the contents of the courses should be selected in relation to the

teaching aims, and in the final evaluation one should have the courage to admit which aims have been achieved and which have not, and then draw the appropriate conclusions (Vitangeli, ITC, Rome).

In connection with this, intervention was advocated at the administrative level as regards the drawing up of syllabuses, this is because lately syllabuses have been broadened, while the hours devoted to mathematics have been reduced. A consequence of this is that if towards the end of the school year it becomes necessary to reduce the planned programme, the cuts will fall on "Probability and Statistics" (Baldoni, ITI, Gubbio). The very interdisciplinary nature of statistics, in fact, reveals itself to be a further obstacle to the teaching of the subject, firstly because of the difficulty of putting together suitable material for the students to work on, then because data referring to different subjects have to be handled in different ways, and finally because it is necessary to have experts who can help reach a satisfactory interpretation of the results (Vitangeli, ITC, Rome). In light of these difficulties, it becomes essential to motivate teachers to widen their knowledge of "Probability and Statistics". Although teachers can easily be culturally motivated, the amount of work required for an accurate introduction of the two subjects, however (De Poli, ITI Venezia-Mestre), also calls for an economic reward for the research carried out (Baldoni, ITI, Gubbio).

The development of the teaching of "Probability and Statistics" through in-service training is now a commonly recognized practice in Italy, but unfortunately it is often fragmentary and improvised.

For this reason, for example, an experimental teaching laboratory for "Probability and Statistics" is being set up in Sicily by IRRSAE, to which mathematics teachers of the various teaching levels, from primary school to university, will give their joint contribution, with the aim of bridging the gap currently existing between secondary school and the lower school levels (Di Pisa, IRRSAE, Palermo).

Research carried out by the Umbrian IRRSAE by means of a questionnaire aimed at teachers, revealed a demand for training in "Probability and Statistics", which was met by setting up a 20-hour course attended by about 60 teachers. However, the impact of this course at student level was not verified (Baldoni, ITI, Gubbio).

Some of participants in the session reported that work packages developed in connection with the training courses aimed at teacher trainers should be available from the Education Ministry (Scotti, LS, Ferrara). It was also observed that the three most recent courses to be held made use of the distance-training system. The systems developed by the Cosenza CUD (Consorzio Università a Distanza) are worth mentioning because of the particular attention devoted to the teaching of "Probability and

Statistics" (Sernini, Padova). Most of the participants, however, were not informed about the existence of this material or about how to obtain it or simply how to have access to it.

The fact that teachers lack information about the various activities in progress and about their results suggests that one of the main objectives could be the co-ordination of all the information concerning the teaching of "Probability and Statistics" carried out by pre-university teachers.

Therefore, CIRDIS could represent a precious link-up opportunity for teachers, by allowing them to exchange ideas, and it could also take up a guiding role by establishing research topics and guidelines (Baldoni, ITI, Gubbio). Morever, the journal "Induzioni - Demografia, probabilità, statistica a scuola", mainly devoted to the teaching of probability and statistics at school, could provide space for the circulation of information about the teaching and teacher-training activities which have been or are still being carried out in Italy.

Although it should be borne in mind that the teachers who attended the meeting are trainers of the Ministry of Education and therefore represent the cream of Italian pre-university teaching, it is however to be noted that the vitality of the debate revealed a real interest in the teaching of probability and statistics, an interest which involves both teachers and students when the usefulness of the two subjects in real-life situations is put to the test.

This interest, however, is held back, on the one hand, by the difficulties of information exchange among teachers and, on the other, by the fact that at present the efforts made and the initiatives developed are not adequately recognized.