STATISTICS EDUCATION FOR FUTURE MANAGERS: NEEDS, OBSTACLES, POSSIBLE SOLUTIONS

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In this paper, we will first give a few examples of the types of on-the-job problems future managers are likely to meet. Then we will expose the difficulties of teaching statistics in management schools. Lastly, we will review possible solutions

INTRODUCTION

When dealing with the training of future executives in the field of statistics, it is necessary to make a distinction between industry-based positions and management-based ones. Indeed, contrary to engineers, most managers do not handle personally the complex statistical issues they are confronted with. Yet, they must master the fundamentals of statistics as well as the rationale behind the main statistical tools and methods: they should be in a position to, first, formulate relevant questions, and, second, to interpret the solutions provided by statisticians.

This paper will first present illustrations of a few problems that our students are likely to encounter in their professional life. It will then expose the difficulties of teaching statistics in management schools. Lastly, it will review possible solutions, in the light of the latest pedagogical research and technology development.

THE STATISTICAL ISSUES CONFRONTING MANAGERS

"The core strategic issue in all corporate structures is mastery of information. This competitive advantage can be measured on the basis of two criteria: on the one hand, the available quantity of reliable information; on the other hand, the business firm's ability to understand and interpret it", says François Morinière, Giraudy-Viacom[1]'s general manager. It is not uncommon for businesses to fail to make full use of the mass of data that is available to them; moreover, whenever the available information happens to be processed by statisticians, results may not be taken properly taken into account in the field.

Laurent Sellier, the top financial officer at Papeteries du Limousin (Smurfit Group[2]) states that tools must first and foremost be operational, and that, all too often, there exists a wide cultural gap between managers and statisticians. Many businesses are content with the use of basic statistics (the calculation of averages, ratios, linear correlation), whereas more sophisticated statistical methods would have yielded more relevant results.

Statistics certainly provide much insight in many corporate questions and issues, particularly in the field of data analysis (market surveys, the positioning of products, brand image surveys, …) and in the field of modeling (how to measure the impact of an advertising campaign; how to design an indicator to detect the possible cash difficulties of customers, …). One should note that two different types of reactions arise from these two fields of application:

- managers might be attracted by the apparent simplicity of some results; yet, a lack of statistical knowledge (particularly as concerns the underlying tools) may lead these managers to interpret the available data incorrectly. (Dassonville and Hahn, 2000).
- Managers might a priori reject models because of their mathematical aspects, and prefer to resort to more intuitive methods (see the case of bank employees, described by Noss and Hoyles, 1996) when these models often turn out to be no more complex to utilize than data-analysis methods.

TRAINING WOULD-BE MANAGERS IN STATISTICS

Quite often, the teaching of statistics in management programs is designed in the framework of standard classes involving both the acquisition of new knowledge and its

implementation. It is to be noted that European countries (particularly Germany, Italy, Spain and France) tend to focus more than the USA on mathematics and to propose exercises which are linked more closely to theory. In our opinion, given the high stakes involved in the relation between managers and statistics, the teaching of statistics should be designed and implemented along the following lines: to allow future managers to master such competencies as the identification and formulation of statistics-based problems, the analysis and interpretation of results. Such a program should meet two requirements:

- the acquisition of the fundamentals of statistics,
- the acquisition of methods, each of which could, on the one hand, illustrate a given management field and foster self-learning in same-approach problems, and, on the other hand, reach the above-mentioned goal.

Under these circumstances it is not an easy task to design a training program in statistics for future managers. Several reasons may explain this. In a management program, statistics suffers from two elements, which are related to the ambiguity of its status. Statistics is perceived as hybrid between mathematics – an abstract concept- and reality. Moreover, it is difficult to position it in relation to management courses such as finance, marketing or HRM. This ambiguous status is all the more detrimental to statistics as our institutions are geared to students whose academic background is very varied. So, in our schools of management, students have an unfocused picture of statistics.

In order to reach its goals, a program should allow students to overcome the "epistemological anxiety" (Wilenki, 1997) they feel when faced to statistical concepts whose legitimacy they question. It should also help students master the complexities of reality in fields of application. Our paper proposes to explore two avenues which may help meet the two objectives.

THE CONTRIBUTION OF TECHNOLOGY

The first avenue could be that of integrating new information and communication technologies into the program. This is precisely what we have been experimenting with since 1994 in our school of management, adapting to the latest development in the field. In 1995, existing technology principally allowed to develop off-line multimedia programs; that is why we designed then a CD-ROM- geared to the teaching of PCA (Dassonville, 1997). The test of this pedagogical tool showed that this new approach, based on dynamic graphical representations, eased -by demystifying it- the introduction to the field, yet did not foster more effective appropriation of those concepts. Besides, when the program was used in self tuition mode, the students felt disconnected from the class environment; they expressed the wish to benefit by personalized tuition, in the form of tutoring sessions. (Dassonville and Hahn, 2000).

The experimentation we are currently conducting with an intranet e-learning platform which associates multimedia course material, personalized tuition, as well as virtual, synchronous classes, will undoubtedly yield more information on the contribution of new technologies to this course.

THE CONTRIBUTION OF IN-COMPANY EXPERIENCE (CO-OP YEAR)

The second avenue we have considered is to make fuller use of the co-op experience now being gained by students attending French business schools. What we are aiming at is actually to blend two different approaches which in turn imply two different relationships with knowledge: namely, in business firms *the value of knowledge is judged on the basis of its practical contribution*, whereas in institutions of learning knowledge is pursued for its own sake (Geay, 1994). It is interesting to note that in our institutions, a growing number of students develop a utilitarian type of relationship with knowledge. They are no longer willing to pursue knowledge for its own sake.

Integrating these two approaches is no easy task, since the wide gap between theory and field practice has long been known (see, in particular, Lave, 1998, Hahn 2000), even though it is generally accepted that such endeavors might ease the understanding of concepts. (see, in the field of mathematics, Boero et al., 1995; Boaler, 1994; Nunes 1993). Confronting our students to problems extracted from the business world generally fails to help them make sense of the

concepts presented in class. In fact, once they have been presented in class, all so-called "real life" illustrations cease to be "real life" (Sierpinska, 1995). Our students tend to believe that the only credible corporate events and situations are those that can be observed within business organizations themselves.

Gérard (1999), Geay and Sallaberry (1999) showed the positive effects of "problem formulation" techniques, that is the formulation - by the students themselves- of the problems related to their own acquisition of knowledge. Thus, the introduction of a co-op year should help overcome the hurdle of the emotional commitment of students to the activity, since it is directly linked to professional life. This commitment is necessary to the appropriation of knowledge .On-going research confirms the interest of this approach in management education (Besson, Delplancke and Hahn, 2001).

CONCLUSION

Devising an effective program to teach statistics to future managers is a complex endeavor. Even though we have no ideal solution to propose today, we are convinced that we should not limit ourselves to presenting students with a number of "recipes" in order to interpret the data produced by "technological black boxes" (Keitel et al., 1993), but should provide them with insight and in-depth knowledge in the field.

We have advocated the exploration of two avenues which, in our opinion, converge. Indeed, in learning situations which closely link class contact and field experience, it is essential to rely on IT, not only in order to adapt to the individual needs of all students, but also in order to shorten the distance -both geographical and pedagogical- between institutions of learning and businesses. Designing a program to teach statistics to would be managers also constitutes a major challenge for statisticians themselves: cooperation and trust between corporate managers and statisticians are bound to promote and affect the jobs of corporate statisticians.

NOTES

[1] Number one in France for outdoor advertising

[1]The largest world producer of cardboard and paper containers, present in 30 countries

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