Chapter 1

Using Statistics to Make sense of Data and Summarized information: the Role of National Statistical Offices (NSOs) in Conveying that to the Public

Juana Sanchez

> *Learning from one another and utilising solutions already found by colleagues in other offices should be more effective than at present. All offices battle with decreasing resources, and it makes no sense to re-invent the wheel. Many exercises and learning materials can, with some fine-tuning and translation work, serve educational institutions in different countries. (Reija Helenius, this book, chapter 5).*

1.1 Introduction

During the past thirty years, countries have made great progress in introducing Statistics as a subject matter into the Mathematics curriculum of schools. With or without the influence of the private institutions in the United States mentioned in almost all progressive curricula (National Council of Teachers of Mathematics, and the College Board), many countries have managed to make of Statistics and Probability one of the strands of their curriculum. Similarly, during the past ten years, tertiary institutions, in large part with the help of the Consortium for the Advancement of Statistics Education, the International Association for Statistics Education and its ICOTS meetings and the American Statistical Association's GAISE guidelines, have started considering that the first Statistics course in a University for a student should not be the Mathematical Statistics course-equivalent in lower division, but rather a course where students get exposed to data analysis and to the whole cycle of asking a research question, gathering data, summarizing, interpreting, using statistical inference to reach conclusions and explaining their answer to the original research question. Technology has made that process much easier. The reader is invited to browse through the numerous documents illustrating the trends in the last years at the International Association of Statistics Education's web site (http://www.stat.auckland.ac.nz/~iase)

Even though progress has been made on paper and in practice, we may not say that the teaching of Statistics as the science of data is a universal outcome of those attempts mentioned above. On the contrary, practice did not follow doctrine, and we are really in a big dilemma in the twenty first century. Individuals in countries where use of the Internet is high have continuous access to statistical information through the Internet. Summary statistics and graphs and conclusions obtained with the use of Statistics are at the reach of a mouse click for everyone. Some NSOs and International organizations like the OECD are already planning the next phase after dissemination: improving interfaces and graphics to convert information into knowledge and to make the information more interesting and useful to new generations. The education industry and

Statistics Education thinkers are already behind, not to mention the sectors of the educational sector that fall in the achievement gap and those countries where Internet use is not widespread yet. All this is resulting in an acceleration of the widening of the achievement gap in education between those who have access and those who don't. If 30 years or so of thinking about how teachers think about Statistics, how students learn Statistics and what is the best way of teaching concepts of Statistics have not resulted in universal statistical education for all, what hope is there that the acceleration of information and its access through the Internet will achieve that? Do we need another 30 years?

Now more than ever statistical education and statistical literacy for the public in general need to start acknowledging that the traditional venues are not enough and that there are many alternative venues to achieve statistical literacy for the population. In this book we hope to present some very successful alternatives: those programs of some National Statistical Offices (NSOs) whose only purpose is to increase the level of statistical literacy of the public. We present them here as examples to follow by other statistical societies and institutions producing summary statistics and statistical graphs.

All the projects presented from chapters 2-6 are Internet projects that have seen the opportunity created by the introduction of Statistics and Probability in school curricula and the acceleration of the dissemination of information as trigger for action. The programs are mature already and are the best that there are in the NSO communities. In chapter 7 we summarize many more that do not achieve the same level or achieved it time ago but are now discontinued. We hope that all these projects will offer examples to other NSOs to follow and will contribute to the continuation of the dialogue as to what are the alternative venues to reach the public to make all more statistically literate.

We do not expect to have covered everything here. We are hoping that with the publication of this first edition of the book, projects that are less well known will pop up and we will be able to work on a more complete second edition. We invite all readers to let us know what we are missing, and to collaborate with us by presenting a chapter on the project that we neglected.

1.2. Some clarification of language used

In principle, everybody producing summary statistics or graphs with which they desire to influence the public, should be responsible for educating the public on the methods used to obtain such numbers, so that the public can reach informed decisions (evidence-based decisions). Unfortunately, that is not occurring. There are some exceptions and the NSOs featured in this book are one of them. These NSOs saw the opportunity that the Internet brought to them and started an intensive campaign to educate the public on the numbers that they produce, the "official statistics." Had

medical researchers, environmental researchers and pollsters done the same, we probably would have a more statistically literate society now. It is never too late to start.

1.2.1 Statistics vs statistics; summary statistics vs official statistics

Statistics educators like to tell students that there is a distinction between Statistics with capital S and statistics. If you are talking about the science that allows us to summarize data, you are talking about Statistics, with capital S, the science of data. It encompasses all the methods and routines used to produce and summarize data to extract statistical conclusions. But if you are talking about the numbers that result from applying the science, you are talking about summary statistics. For someone teaching Statistics, the science, the distinction is clear. If you talk about the statistics you are talking about the summary statistics, the numbers obtained from the data after applying the methods. Sometimes in web pages of NSOs, and the ones in our chapters are no exception, the distinction is not made, and educators get the wrong impression. That should not be the case.

Official statisticians are producers of data and the summaries of that data. Their summary statistics are called official statistics, because the statistician general gives its seal of approval (i.e, the number has been obtained so carefuly—large response rate, large sample sizes, the appropriate statistical methos—that is is worth releasing). Thus it is natural that government statisticians emphasize constantly the statistics, and some times use the term statistics (with lower case) to talk about Statistics and viceversa.

1.3 Where it all began

Part of the International Statistical Literacy Project years ago was to discover how national statistical offices further statistical literacy and user skills. As a whole, one of the mission of the **International Statistical Literacy Project (ISLP)** is to provide those interested in statistical literacy with information and resources and to aid them in the development of statistical literacy around the world. A few years ago the main focus of the project was on the development of a series of webpages that would provide users with resources that are useful for the development of statistical literacy at all levels from Primary/Elementary School through Adult Learners. These pages are now widely used. There are also webpages for official statisticians and for journalists and the mass media. Further, there is a webpage listing statistical literacy projects, websites, etc. that have been developed by national statistical offices, national statistical societies and other non-profit organisations. National statistical offices have their own webpages within the ISLP project: Descriptions and links to training programs and learning material sponsored by national and international statistical offices. At the moment, the pages contain descriptions of the training programmes and learning materials produced by over 30 national statistical offices or international organisations. The information on the pages was collected in 2003-2004 by an extensive inquiry initiated by Reija Helenius of

Statistics Finland, and continued since then with her, Paola Guiacche and Carol Blumberg. More information is added to the pages all the time. The general tendency seems to be that more and more is being invested in services for educational institutions and different co-operation modes. The Internet and the web learning environment create increasingly better opportunities for this. Several statistical offices already offer web learning materials through the Internet. You may access all the pages of the ISLP from its home page (http://www.stat.auckland.ac.nz/~iase/islp/home)