

Chapter VI: Training of statisticians for media relations and training of journalists and media specialists in statistics

TABLE OF CONTENTS

6.1 (LEARNING IN THE EACH OTHER’S CLASSES) Training of statisticians for media relations, training of journalists in statistics.....	3
6.1.1 Introduction.....	3
6.2 (PURPORTS OF COURSES) Techniques and approaches in training of statisticians in media relations.....	3
6.2.1 Best practises of training in media relations.....	4
6.2.2 Getting educated in ways the media work.....	4
<i>Why training in media relations.....</i>	<i>4</i>
<i>Requirements for media training.....</i>	<i>5</i>
<i>Types of media relations training programs.....</i>	<i>6</i>
Writing for the media.....	6
<i>Topics covered in writing for the media courses.....</i>	<i>6</i>
Encountering the media.....	7
General media training.....	8
Ad hoc media training.....	10
6.2.3 More than knacks of journalism.....	11
6.2.4 Writing tabloid-style: a cultural shock.....	12
Arrangements for the change.....	13
Implementation of the new style.....	13
Results.....	13
6.3. Approaches in statistical training of journalists.....	14
6.3.1 Explaining statistical issues: it can be done.....	14
Set of awkward questions.....	15
Six points to explain science.....	15
<i>Common foibles of the press.....</i>	<i>17</i>
6.4 (HOW TO FIND FACTS) Best practices in statistical training of journalists.....	17
6.5 (TO DEMONSTRATE POWER AND BEAUTY OF STATISTICS) How are statistical offices promoting statistical literacy among news media and the public?.....	18
6.5.1 Promotion of statistical literacy.....	18
Making statistics more understandable.....	18
<i>Easy public access to statistical information.....</i>	<i>19</i>
<i>Role of meta-data.....</i>	<i>19</i>
<i>Means to convey metadata.....</i>	<i>19</i>
Product development.....	20
<i>Educating the Users.....</i>	<i>21</i>
Books, articles, brochures, web sites employed.....	22
<i>Educating the Media to Use Statistics in the Right Way.....</i>	<i>25</i>
6.5.2 Teaching statistics in secondary schools.....	26
6.5.2.1 Cooperating with the Education sector.....	26
<i>On-line manuals.....</i>	<i>27</i>
Interactive exercises.....	27

<i>Flags as flagships of statistics</i>	28
<i>Kid's pages</i>	29
<i>Health statistics courses</i>	29
6.5.2.2 Elementary statistics for first grade students	30
<i>Net-learning</i>	30
Schools and Teaching Statistics.....	31
<i>Methods of teaching statistics</i>	31
<i>Subjects besides mathematics</i>	32
<i>Statistical School-Nets</i>	33
<i>Useful Links</i>	33

6.1 (LEARNING IN EACH OTHER'S CLASSES) Training of statisticians for media relations, training of journalists in statistics

6.1.1 Introduction

If statisticians are looked at as their own spokespersons, is it necessary for them to have inherent skills of communication? Should they acquire some knowledge about the ways the media work? Mostly it is not so demanding as it refers just to have a glance into secrets of another trade. However, this acquaintance could become extremely useful when considering the future of statistical data dissemination. The same might apply for journalists from the other side. Statisticians and journalists can best work together when both sides have knowledge about their counterparts. This is the reason for agencies to arrange **courses for statisticians and for journalists**, some of them offering more than mere factual material, providing excursions to the other profession's localities. Striving to make statistics more appealing for the general public requires communicating its methods and ways of thinking. Therefore press offices are contributing to improve statistical literacy among the representatives of the media – and general public.

6.2 (PURPORTS OF COURSES) Techniques and approaches in training of statisticians in media relations

Through a variety of media relations programs, statistical agencies are generally able to provide designed staff with the necessary training to deal with the media. They need to start **thinking** a bit **like reporters** and to know **how to communicate** with all sorts of groups of the press.

News media is a competitive business, which force reporters to find an interesting turn that will make their **story different from other media outlets** and irresistible to the public. In order to succeed they have to find credible sources for their story, willing to assist in its creating – and that before the deadline. If this is understood, one would stop wondering why are reporters superficial, flashy, why do they use only fragments of a well built statistical report.

A sound **media-relations strategy** with the National Statistical Offices has the aim at ensuring that its own staff be ready and able to deal effectively with requests from journalists, up to and including televised interviews. Thus the members of the agency's staff grow authorized, official spokespersons for their respective areas of expertise and responsibility. To assist staff in carrying out this demanding role, a wide variety of training is provided in majority of National Statistical Offices, from **basic media relation courses** to **interview techniques** and preparation. Through this training agencies generally become able to implant confidence in staff, keep control of interviews and avoid situations where inexperienced staff may be stampeded into erroneous, inappropriate, or ill-advised comments.

Given the **limited ability of journalists to analyse** data independently, and their lack of time to carry out such analysis courses should be arranged: **journalists** have also to **be trained**.

Sophisticated methods are less of use for them, instead, apart from a condensed presentation of notions and the ways calculations are being carried out, perhaps it is to be explained issues, which demonstrate the limitations of scientific cognition, reliability of inference. Or pointing out that everything studied varies from study to study: this goes well with reporters.

Their **papers start with the least** and finish up with the **most believable points**. And it will be something else to hold a course for journalists, used to attend briefings, or embargoed data release of macroeconomic indicators and for those who are dealing mostly with demographic issues or with events of home policy.

All that learning activity reminds a **kind of translation**, interpreting figures, making sense of their increase or of decrease and on the other hand, summing up long paragraphs in one sole trend, showing up determinative proportions. It could be done through **fostering statistical literacy**, for what purpose it is once again Internet, which offers most promising chances.

6.2.1 Best practises of training in media relations

6.2.2 Getting educated in ways the media work

National statistical agencies are professional organizations engaged in developing and making widely accessible objective, quality information that serves all sectors of society. They have a responsibility to respondents and clients. But in the end, their **audience is the general public**, and the **news media** are the best and most powerful tool for **reaching this audience**. If the media are to do an effective job in **communicating statistics** to a general audience, it is imperative that statistical **agencies provide** them with **information** that is significant, understandable and relevant. It is also important that **agencies respond promptly to media requests** for interviews, providing journalists with not only data, but also with **meaningful analysis** on how these data shed light on current issues in the public domain. An agency's best efforts to provide accurate, timely and relevant analysis can be jeopardized if the **message** written or verbal is not **presented in a clear, concise, simple manner**. Its efforts can also be jeopardized if analysts are not properly prepared to handle queries from the media, or if journalists cannot readily obtain clarifications or additional information on any given release of data or related issues.

Why training in media relations

National statistical agencies have a common **goal in disseminating data**: To improve the amount and **accuracy of media coverage** of the agency's information releases. To achieve this, agencies must strengthen their **partnership with the media**, who are the gatekeepers between the statistical agency and the public, and who consequently exert a powerful influence on how the public receives its information.

In addition, policy makers may often rely on the media for a quick assessment of public opinion and awareness, and use them to track trends in major public issues. **Agencies** can help their own cause by being **accessible and equitable to the media**, and by understanding the needs of the media, the way journalists operate, the techniques they use and the limitations they face.

The **aim of media relations training** programs in statistical agencies is to heighten **awareness of the journalistic world** among statisticians, economists, demographers, sociologists, scientists and other analysts. Such programs can also help them develop materials suitable for the media, and prepare them in terms of attitude, knowledge and ability to deal with the media.

In the statistical agencies of Canada, the Netherlands and the United States, **training** in media relations is usually an integral and **central component of the communications or public affairs program**. Though not all agencies have as such an on-going formal training program, most appear to have at least an advisory function serving the same goals. Training courses are also an excellent venue for explaining to staff the importance of media relations programs and policies, clarifying roles and responsibilities and promoting various media relations' services. They are also an **effective means** of establishing and **maintaining good collaborative relationships** between communications and subject-matter staff.

Requirements for media training

Establishing and conducting a successful **media-training program requires** certain levels of policy and resource **support within the statistical agency**. While programs may vary in their extent, scope, approach, and procedures, all have certain basic requirements.

First, it is necessary that the **agency's senior executive** and other senior managers support and **value media training**. Management must convey its awareness of the need to develop and improve skills in working with the media. **Statisticians**, analysts and others who will be trained must have a full appreciation of the benefits of training, and **must want to improve their media relations skills**.

Public affairs and communications officers can foster this environment by promoting the benefits of media training. But, most effectively, it can be done by word of mouth, that is, recommendations from other subject-matter experts who have benefited from training, or who have previously run into trouble because they lacked advance planning and training.

Trainers can be in-house **communications staff** or **consultants hired** under contract. However, any outside trainers should have an intimate knowledge of the particular mission, as well as the agency's policies, to tailor the training program to the needs of both subject matter people and the media relations program. Communications officers might supplement resources by assembling panels of experts, inviting **guest speakers**, or collaborating with **other agencies** to share trainers. **Physical resources**, such as a **closed-circuit television studio**, can be important to an effective training program, notably when preparing for media interviews. **Mock interviews** should be as close as possible to the real thing. Studio settings add to realism and help staff prepare for the actual interview. However, the process should not grind to a halt for want of a particular piece of equipment, or because an appropriate facility cannot be booked. Finally, a **training program should effectively communicate** the agency's media policies, adding weight to **the agency's mission** and objectives in media relations.

Types of media relations training programs

a. Writing for the media

The **first contact** with the media is often through a **written message** C a press release, an analytical publication or a technical report. Right away, there are **pitfalls to overcome**. Authors of these publications rarely meet face-to-face with journalists to help them interpret messages.

At the same time, **few journalists have the knowledge** or expertise to extract the most important elements from an analytical article, or to adapt the text for a general audience, without the **risk of altering the message**. In addition, journalists usually work against the clock to tight deadlines. It is essential that statistical agencies pay **special attention to any text** destined for the media. They must communicate clearly in simple language if they want their information echoed accurately and positively. Some **key messages** should be written so clearly that they could be **read verbatim** on radio or television newscasts. If news releases are too technical or too long, they might not be covered at all. Even worse, agencies run the risk of having their data misinterpreted, or covered erroneously.

In general, **training courses on writing** for the media are designed **to expose agency staff to the constraints** involved in preparing news releases and other materials destined for the media, as well as to share writing tips and techniques. Ideally, the individuals who provide this training will themselves have received training on how to train.

Topics covered in writing for the media courses:

Statistical agencies generally inform the media through news releases about the context, trends and relationships behind their numbers. With this in mind, courses on writing for the media usually concentrate on:

- Policies, guidelines and tips concerning media relations.
- Understanding the media and how to strengthen our partnership with them.
- Doing analysis: analytical approaches to extracting newsworthy and relevant information from new data sets; how to identify important contextual information that should be presented in releases.
- Writing in a journalistic style, in a clear, concise and simple fashion, and developing strong story lines, leads and subheads; and,
- Presenting tables, charts and graphs effectively.

Courses usually include **hands-on exercises** for participants. At **Statistics Canada** and **Statistics Netherlands**, for example, course participants **prepare and critique a press release** in class. Structured training sessions that are held periodically range from half-day seminars to two-day courses, with follow-up sessions as needed. In **Canada** and the **United States**, shorter sessions of one or two hours are also offered as segments of regular subject-matter training courses. Moreover, communications **or public affairs officers offer assistance** to data specialists in preparing materials aimed at the media, including writing advice. *In conjunction with a local training institute, the Press Office at **Statistics Netherlands** gives courses on how to write press releases, which is also part of a more general course on writing for the general public. The course pays special attention to writing long articles in a user-friendly fashion. The Press Office has published guidelines and a checklist on writing press releases, which statisticians can consult as needed.*

*At **Statistics Canada**, the Policy on spokespersons and media relations requires subject matter people to prepare materials or events destined for the media in close co-operation with the agency's communications officers to ensure consistency of message. Statistics Canada's first line of communication with the media is *The Daily*, its official release bulletin thus it is the ideal vehicle to improve communication with the public through the media. A formal **two-day training course** called *A Writing Effective Releases for The Daily* has been in operation at Statistics Canada since 1994. The course was developed around guidelines for writing news releases prepared by a group of senior managers under the chairmanship of the Chief Statistician of Canada. This Senior Editorial Review Board critically reviewed all major news releases in *The Daily* over a period of 22 years. In essence, these guidelines stress two factors: writing news releases in a journalistic style, and expanding analysis to show the relevance and context of new information.*

The course offers **structured training on site** for up to 12 people at a time. During the first day, analysts participate in **workshops on writing journalistic style** and analyzing data. On the second day, they participate in a hands-on exercise, **preparing** and critiquing their **own news release** in class. Courses are tailored to meet the particular needs of a given subject matter division. The **credibility of the trainer** is crucial: it was proven extremely effective to hire an experienced journalist to deliver the training program.

American statistical agencies use a number of approaches. At the U.S. Department of Energy, analysts have a **checklist to help prepare news releases**, encourage them to determine the most important information to convey, and to help identify specific audiences. The checklist describes how to fashion a lead paragraph, and cautions about providing too much detail and relying on jargon. The emphasis is on **language for the lay person**, and on expressing the information in a relevant, meaningful way for the average citizen.

*At the **U.S. National Center for Health Statistics**, the **public affairs office prepares most of the press material**. Analysts are asked to identify what is known as the **SOCHO** (Single Overriding Communication Health Objective) **3/4 the main facts to be communicated 3/4 to help shape and direct the material**. The author often prepares a **SOCHO page**, which identifies the major messages, audiences and final take-home message. This exercise also helps the analyst prepare for later interviews by focusing on the most important facts in an array of information.*

b. Encountering the media

To meet their objective of informing the public, statistical agencies rely heavily on the media to reach those segments of the public who would not otherwise know about their figures, products and services. Every media encounter is an opportunity to inform the public. A 10-minute interview can sometimes become a one-time opportunity to convey an important message to the public. The difficulty for analysts, particularly in a radio or television interview, is that they have no way of knowing exactly what portion might be aired. Radio and television journalists often require only a 10-second "sound byte", and discard the rest of the interview.

b.a. General media training

In most agencies, experienced media relations officers deliver hands-on structured **courses on a regular basis** to help statistical agency staff acquire the skills to deal effectively with the media. This periodic, structured training usually lasts for one or two days. Courses include interview taping and critiquing exercises for participants, during which they learn to feel comfortable in front of microphones and cameras.

Topics covered in encountering the media courses:

- · Policies, guidelines and tips concerning media relations.
- · Mastering the media interview (print, open-line, live and taped television or radiointerviews):
 - how to prepare for a media interview by targeting the audience and structuring the answers;
 - how to effectively communicate messages and remain in control of the interview, and;
 - how to answer different types of questions (including difficult and hostile ones).

Statistical agencies use this training to instill confidence in their staff, help them keep control in interviews, and hopefully avoid situations in which inexperienced analysts are stampeded into erroneous, inappropriate or ill-advised comments. Training should demonstrate the importance of planning and structuring responses, rather than just reacting to journalists' questions.

***Statistics Canada** has made this type of media relations **training mandatory** for any employee who deals occasionally with journalists. Under its Policy on spokespersons and media relations, program directors must ensure that spokespersons and data contacts have or obtain the necessary training to do media interviews.*

*This course, led by a Statistics Canada instructor, has been designed as a comprehensive media training program. It consists of a **combination of lectures, videos, slides, planning exercises and role-played media situations, including simulated interviews in a studio environment.***

*Analysts are asked to complete a **pre-course questionnaire** to identify issues and lines of questioning. This enables the instructors to link the training to the participant's experiences, abilities and goals. The information also helps them prepare a line of questioning tailored to each participant for use during individual simulated interviews. Participants get a manual, as well as a pocket tip booklet. Most of the teaching materials were developed by a private consulting communications firm and customized to suit Statistics Canada's requirements.*

*A **refresher session** is also part of the agency mandatory training program. The refresher consists of a one-day summary version of the two-day Encountering the Media course.*

*To help statisticians unfamiliar with media relations, **Statistics Netherlands** has prepared a **document identifying pitfalls around communications** with the media. The Press Office has also developed guidelines for press contacts, which mainly outline rules for analysts, as well as their rights and responsibilities in their dealings with broadcast and print media. The guidelines cover preparing the interview with a communications specialist, and trying to forecast how the interview will be conducted and which questions will be asked.*

*Statistics Netherlands also arranges for its trained **spokespersons meetings** twice a year to learn from each other's experiences and to discuss special topics, such as the policy on embargoes. During these meetings, the agency's spokesperson for the economy gives a talk on the state of the economy so that all spokespersons can present economic figures in the proper context.*

*The **U.S. Bureau of Economic Analysis** runs regular training, which is an **annual requirement for all analysts** who work with the press. The Bureau also has a set of guidelines, which provide guidance on policy as well as tips for dealing with the press. The public affairs chief conducts mock interviews with the statisticians involved in each release so that they can benefit from each other's answers.*

The **U.S. National Center for Health Statistics** provides a general overview for all staff. This training provides all professional staff members with an understanding of the media. Individuals who are likely to do frequent media interviews attend a longer **one-day training session**. This training provides opportunities to practice the various types of on-camera interviews. The National Center for Health Statistics has developed a booklet to help staff prepare for potential interviews with all forms of news media. The guide includes checklists for preparing for interviews and controlling messages during interviews. A longer document outlines good practices before, during and after an interview.

Every year **Statistics Finland** provides a course or two on writing skills for the experts in the office. The purpose of the **courses** is not only to **produce better releases**, but also better publications. Special courses are also held on TV presentation skills.

The **US Bureau of the Census** offers **training** for media specialists, statisticians and analysts in **writing skills** and presentation techniques that aim to keep written and oral presentations simple, clear, and focused.

For 20 years the Bureau has supplied State and Local data centers with information and training to help them educate the public in their areas about the information available from the Census Bureau and other agencies. These agencies and centers also help in our efforts to improve response in censuses and surveys (<http://www.census.gov/contacts/www/cdatace.html>).

The **US Bureau of Labor Statistics** has initiated a **program to improve the writing skills** of staff throughout the agency, so that they can better communicate complex ideas in plain language. Staff training is provided periodically to meet the specific needs of the media. A style guide for BLS staff is available in print form and on the BLS Intranet.

The **US National Center for Education Statistics** offers **seminars and courses** for its own staff and staff from other offices within the Department of Education. A number of topics have been covered, including 1) statistical methods such as logistic regression, hierarchical linear modeling, variance estimates for complex sample data, and missing data imputation; 2) computer applications such as SUDAAN and WesVarPC; 3) contract management; and 4) emerging educational priorities, issues and policies. Courses are either taught by in-house staff who have the needed expertise or outside experts in pertinent fields.

At the Annual Summer Data Conference, state coordinators responsible for reporting elementary and secondary level fiscal and non-fiscal data to NCES are provided training on how to report data to NCES (<http://www.nces.gov/conferences>).

The **US Bureau of Transportation Statistics** has held **seminars** on various data issues for Department of Transportation staff. They have held brown bag lunch seminars featuring prominent people in different areas of transportation and statistics. They sponsored a course designed by a BTS staff member called "Introduction to Surveys and Using Survey Data", which gave Transportation policy staff, a crash course on designing a survey, collecting data, editing data, and analyzing data, including a unit on sampling and non sampling errors.

b.b. Ad hoc media training

Statistical agencies also offer **advice and tailored courses** to meet particular needs. Tailored courses designed to help analysts prepare for the release of their data are a common practice, especially when publishing major releases or reports that are likely to draw media attention. When time permits, these courses are two-fold exercises. Media relation's officers first meet with analysts to determine potential issues and establish the appropriate communications strategy. Advice is also offered on how to prepare positioning statements and key messages, and how to deflect difficult questions.

This training session is followed a few days later by a **taped mock interview**, during which analysts get an opportunity to deliver their messages. The **interviews are reviewed and critiqued**, sometimes in a group setting, **to fine-tune the delivery**. Such sessions are particularly effective when there is time **to brainstorm about the type of questions** reporters will have and the focus of media coverage, and help prepare analysts for interviews.

Analysts too often concentrate on the data alone, or the content of their report. They have to be reminded that their **data are not being released in a vacuum**, and that the media will cover their story in relation to other issues, news and events. Reviewing the public environment for the analysis and broadening their view from their particular study to the “real world” is an important aspect of media training.

Advice on how to deal with the media is also always available to subject-matter analysts. *For example, media relations officers at **Statistics Canada** monitor media coverage* resulting from interviews or public appearances by other agency staff to permit rapid response to misleading or erroneous reporting. *Media relations officers meet routinely with interviewees to discuss their performance during their last media interview.*

Ad hoc media training is perhaps the easiest to evaluate. There is almost immediate feedback on the extent and effectiveness of coverage. *At the **U.S. National Center for Health Statistics**, media relations officers meet program staff to review the taped or print coverage with the aim of improving skills in media interviews, and improving media materials and training. Public affairs and program staff see the situation as one in which they learn from each other.*

In summary, **training programs** at statistical agencies are **similar**, despite **differences in organizational structure and culture**. The best media training programs:

- have a carefully designed and developed strategy which matches program mission to communications goals;
- have the support of top management and the willing participation of subject-matter staff;
- focus on developing and managing the message, and encourage staff to view media interviews as an opportunity to communicate in an effective manner;
- are dynamic, with capacity to adapt as media and program requirements change;
- are flexible enough to meet the needs of the specific program staff involved, while general enough to maintain agency goals and standards;
- are active and finally;
- are evaluated both by communications and program staff, and are modified and improved with input from staff, the media and peers.

6.2.3 More than knacks of journalism

*According to **Statistics Sweden** the press office’s job is to disseminate releases without the strict critical responsibility for the content, so **experts do write their own press releases**. A lot of releases are monthly, thus it may occur to a statistician to have write 12-15 releases a year. But still with a sum of 300 releases a year there are a lot of different writers, approximate 80 persons. There had been some **criticism from journalists** that one can notice that the authors are statisticians and experts and the releases were **not so reader-minded** for journalists. **Scientific expressions** were used in excess and the their whole frame was not equivalent concerning disposition, content and level of information. The press office gives advice to all writers in advance how to write successfully. And arranges with regularity **educational courses for statisticians** and other experts writing press releases. Their teachers are professional journalists.*

The statisticians have to be **familiar with the working conditions for journalists**, so they will understand in which environment their press releases end up. An editor's day at the news desk has low similarity to a workday of a statistician.

The main part of these courses is to teach participants how to **write in a journalistic way**. Besides the rule "KISS – keep it short and simple" that also means another way of **disposition of material**. When writing, you have to be **selective**. It is a common experience that if you do not do the selection of what is the main news, the journalists will do it, and sometimes in a wrong way statistically. The course is one day long and also contains "write better Swedish", some **language training**.

Few of statisticians have experience in **TV-contribution**. It is a rather stressful situation to be in front of the spotlights knowing that the broadcasting can be seen by all your colleagues, neighbours and friends all over the country. The only way to be able to act with self-confidence in front of TV cameras is to practise and practise over and over again.

The Press Office therefore arranges from time to time a course, "How to deal with the media representatives and journalists and how to behave in front of a television camera". Teachers are a former television journalist and a photographer. Most of the participants are heads of the departments and employees at the Director General office, whose mission there is to represent Statistics Sweden at official occasions, with **participation being voluntary**.

The course consists of one intensive day in a real TV-studio with spotlights and cameras. The participants come from different agencies and private companies too.

The **working conditions for journalists** are quite different from those of the statisticians.

Normally most of the statisticians have a room of their own. Even when there is a lack of time they usually have several days to compile a report. The newspaper editor has to appraise the importance in the content of 3-400 sheets of fax papers a day to decide which ones have the news value to be adopted for publishing. The news editorial office is a turbulent place to be in.

The Press Office therefore arranges **educational visits to newspaper offices** for statisticians to let them feel the atmosphere and see where their news releases end up.

It becomes obvious for the statisticians how very fast the journalists have to estimate the news value of all the releases that flood the editors' office.

The **legal framework** has to be also well known among the statisticians dealing with the press. The Press Office has prepared a media policy confirmed by the Director General.

6.2.4 Writing tabloid-style: a cultural shock

In September 1997 the **Central Statistical Office of Ireland** formally launched its new logo and corporate image and introduced a **radical change** to a new user-friendly style of statistical release. A number of steps had been taken before this stage was reached. Firstly design consultants had recommended on a **new layout for releases** adding a graph and a table to a revamped front page.

Secondly, a report produced by a former press officer to the **British ONS** and **Eurostat** recommended that the texts on the front page should more closely resemble a news release.

Prior to the changeover **statistical releases** had been presented **in a traditional way**. In some cases information (meta data) relating to the particular survey or series was given prominence followed by the more interesting information relating to the actual story the release told. Consequently many **journalists switched off** before they got to the message.

Arrangements for the change

The idea of the **new release style** was to give a clear **simple picture on the front page** with all the information that journalists and others need immediately available at a glance. Following on from this flesh can be added to the bones but continuing the same terse style with eye-catching sub-headings and bullet points where appropriate.

Amongst the difficulties faced that there was **no tradition of this type of writing** within the office. Being both a civil service office and a statistical office the tradition was one of cautious accuracy explaining carefully the rationale behind what we were doing and being slow to highlight special aspects of the release. Moving to what would be described as a more “tabloid” style of writing was a bit of a culture shock for the whole agency. To assist to achieving this the office **hired an experienced journalist** as a media adviser on a temporary contract.

The office had to be careful to bring its staff with it on the course it had decided to take. To achieve this it set up a **Media Relation Project Group** chaired by a director and composed mainly of the senior statisticians responsible for the production of statistical releases. The purpose of this group was to work with media adviser in drawing up and overseeing the implementation of an **action plan** to introduce the new release arrangements; to ensure that there was a co-ordinated approach to the project and that in each area there were people responsible for implementing the decisions taken.

To monitor developments and ensure compliance with standards the office set up a **four member editorial board**. It reviewed all releases as they were developed and where necessary referred them back for further development until they reached an acceptable format. An 18 weeks long action program was agreed for the media adviser.

Implementation of the new style

As part of the program the media adviser developed and ran a course on writing releases, which closely resembled a scaled down version of the course, offered by Eurostat. This was a **full day course** and was the basis of instructing statistical staff in the new writing style in particular. Staff then produced drafts of releases and these were **developed with the media adviser** and finally submitted to the editorial board for approval. All sections took on the new style and while various problems arose in particular situations these were gradually eliminated. The net result was by the time of the launch of the new image the office had **acceptable versions of all releases**. In the month prior to release a **parallel run** in both the **old and the new style** was done. This turned to be essential as after installation of a new desktop publishing system many quirks were found both in the system and the releases. These were eliminated before the actual production of the new releases.

Results

The new style releases had been very well received by the media generally. There had been a perceptible **increase in references to new releases**, although it is impossible to determine whether the changed style alone accounted for this or the fact that figures were directly related to many currently topical issues.

The editorial board **reviewed the releases** generally after the new style had operated for about six months. One point, which was noted in a number of cases was that the contents of the **original new style release** had been taken as a **type of template**. Staff had continued to use the text only updating the figures. This occurred even in cases where there might be a better story in a different aspect of the figures.

6.3. Approaches in statistical training of journalists

6.3.1 Explaining statistical issues: it can be done

“No wonder people are confused about global warming. Consider this sample of the scientific ‘information’ that regularly bombards us. DECEMBER – ‘Is the earth really getting warmer?... The planet does not really seem to be sweating’... JANUARY– A Global Warming Resumed in 1994...”

So began a magazine article about this important – and confusing and statistical – issue. It is one of many scientific, medical and environmental issues on which we hear people, including reporters

and editors and radio and TV news directors, say, “What’s going on? Why do they say one thing today and another tomorrow?”

The confusion is understandable but unnecessary. The media and the public can learn that many issues do not lend themselves to quick answers, that **one study does not prove anything**, and that for guidance it must look for a consensus of the best studies and the best options. The media and the public also have to learn something about the nature – and uses and **limitations – of statistics**. How can scientists and statisticians and the information officers of scientific agencies help them? How can they learn to explain statistics and statistical issues? Let me help by explaining how I have been explaining statistics and statistical issues to journalists.

The problem of all journalists and of the public, is how to cope with the fact that when it comes to any health or risk or environmental issue – the same can apply to statements about crime or welfare or government or virtually any issue – one side tells the sky is falling, the other says it’s not. A politician says, “**I don’t believe in statistics**” then maintains that “most” people think such and such. Based on what? A poll says, “Here’s what people think, with a “three point plus or minus margin of error.” **Believable?** A doctor reports a “promising” new treatment. Is the claim justified or based on a biased or unrepresentative sample? An environmentalist says a nuclear plant or waste dump causes cancers. An industrialist indignantly denies it. **Who’s right?** What can one believe? What’s worth reporting? What’s worth doing something about?

Many statisticians and epidemiologists assert that a critical examination of claims about almost anything requires **not so much an understanding of formulas** as an **understanding of the nature of rational evidence**: the array of facts or probable facts that make people believe something is believable.

An honest investigator may first form a **hypothesis** or theory, **an attempt to describe truth**, then try **to disprove it** by what is called the null hypothesis: that there is not such truth. To back the original theory, the study must reject that hypothesis. In much the same way, a jury is told to start with a presumption of innocence and say to the prosecution: Prove your case, provide the evidence to disprove innocence.

Set of awkward questions

Journalists should try **to judge** claims of fact, whether by scientists or physicians or others, **by similar rules of evidence**. They can do this by beginning with some simple, yet **revealing questions**, questions which scientists, officials, and information officers are beginning to hear from sophisticated journalists. Such as:

- How do you know? Are you just telling us something you “know” or have “observed” or “found to be true”? Or have you done or found any studies or experiments?
- What are your data? Your numbers? How or where did you get them?
- How sure can you be about them? Are there any possible flaws or problems in your conclusions? Salespeople are sure. Honest investigators admit uncertainties.
- How valid – in science, you must explain, valid means accurate – are your numbers and conclusions?
- How reliable – and explain that this means reproducible – are they? Have results been fairly consistent from study to study?
- What is your degree of certainty or uncertainty by accepted tests?
- Who disagrees with you? And why?

Those who communicate to the media should be prepared to answer such questions – or convey such information whether or not asked. Journalists learn that the very way someone answers, or dodges such questions can reveal much.

Six points to explain science

One can go a long way toward teaching journalists and the public to **discern probable facts from probable trash** by explaining **six basic concepts** that apply to all science, all studies and virtually all knowledge of society and the universe.

1. UNCERTAINTY All science is almost always uncertain, or uncertain to a degree. Nature is complex, people are more so, research is difficult, observation is inexact. Almost all studies have flaws, so **science is always an evolving story**, a journey taken a step at a time. Almost all anyone can say about atoms or cells or human beings or the biosphere is: there is a strong possibility that such-and-such is true, and we may know more tomorrow.

This **tells** us why things so often seem settled one way today and another tomorrow, and **why so much is debated**, whether the effects of global warming, a pesticide, a low-fat diet, or a medical treatment. Why so much uncertainty? Lack of funds to do enough research. The fact that doing valid research is not easy. And when it comes to health and environment, a main reason is a lack of long continuing observations of large populations.

It is important to **tell all this to journalists** and the public so they will understand why “they” say one thing today and another tomorrow. And how uncertainty need not impede crucial action if society understands and uses the rest of these principles.

2. PROBABILITY Scientists live with uncertainty by **measuring probability**. A commonly accepted numerical expression is the P value, determined by a formula that considers the number of subjects or events being compared to decide if a result could have seemed to occur just by chance, when they actually had been no meaningful effect.

We cannot trust a study that is **not statistically significant**. But this may or may not mean practical (or, in medicine, clinical) significance. Nor does it alone mean there is cause and effect. Association is not causation without further evidence.

The laws of probability and chance also tell us **to expect some unusual**, even impossible sounding events. Just as a persistent coin tosser will sometime toss heads or tails several time in a row, nature will randomly produce many alarming clusters of cancers or birth defects that have no cause but nature’s coin tossing. These produce striking anecdotes and often striking news stories, but they alone do not prove a cause.

Science **cannot prove a negative**. The burden of proof should be on those who say something is true.

3. POWER Statistically, **power means the likelihood** of finding something if it is there, say an increase in cancer in workers exposed to some substance. The greater the number of cases or subjects studied, the greater a conclusion’s power and probable truth.

We must be wary of studies with only a small number of cases. Sometimes **large numbers indeed are needed**. For lack of power – enough cases – a condition that affects one person in hundreds or thousands may never be associated with a particular cause, and a large yet scattered number of illnesses may remain forever unidentified as “environmental” because they remain a fraction of the vastly greater normal case load.

4. BIAS Bias in science means **introducing spurious associations** and reaching unreliable conclusions by failing to consider other influential factors – confounding variables or co-factors, in plain language, other explanations. Among common biases: failing to take account of age, gender, occupation, nationality, race, income, health, or behaviours like smoking. **Polls**, political and otherwise, as well as medical and environmental studies, **are all subject to sampling bias**, since every group studied is only a sample of larger population.

One can watch for bias by asking, “Are there any other possible explanations?”

5. VARIABILITY A common pitfall of science is that everything measured or studied **varies from measurement to measurement**. Every human experiment, repeated, has at least slightly and sometimes markedly different results.

Among the reasons: constantly fluctuating human physiologies; common errors or limits in measurement or observation, biologic variations in the same person, between persons, and between populations. A related concept: we should ask too about any association's statistical strength – its odds.

6. HIERARCHY of STUDIES – from the least to the generally most believable, starting with simple anecdotes, going on to more systematic observation or “eyeballing”, then proceeding to true experiments, comparing one population sample with another, under controlled or known conditions. Many epidemiologic and medical **studies are retrospective**, looking back in time at old records or statistics or memories. This is often necessary. It is **often unreliable**. Far better is the prospective study that follows a selected population for a long period, sometimes years. One study rarely proves anything. One must seek out the most credible evidence, the most likely probabilities. The most believable studies and observations are those **repeated among different populations** with much the same result.

Common foibles of the press

Many news stories simply **fail to include some numbers** that anyone would want for intelligent decision-making. Medical journals are not exempt.

In the reporting of risk, there is wide lack of understanding of the **difference between a plain number and a rate**. It is necessary to emphasize that a rate has to mean so many per so many per unit of time. A newspaper headline once read, “Airline Accident Rate Is Highest in 13 Years”. The story, like many others misusing the word “rate” reported no rate at all, merely death and crash totals. A correction had to be printed pointing out that the number of accidents per 100,000 departures – the actual rate, the “so many per so many” – had been declining year after year.

Be honest about risk numbers. Choose those that are truly meaningful. To influence journalists or the public, someone can choose an annual death total or deaths per thousand or million, or per thousand persons exposed, or deaths per ton of some substance, or per ton released in the air or per facility. There are **lots of choices to make something seem better or worse**.

There is an old and useful adage: **if you would have public confidence, confide in the public**.

Those who tell journalists their conclusions should tell them how they meet the statistical tests that good scientists and statisticians prescribe. They should not pretend that conclusions are written in stone. They should emphasize that the pursuit of knowledge is a continuing – and worthwhile – struggle.

6.4 (HOW TO FIND FACTS) Best practices in statistical training of journalists

*It happens now and then that **Statistics Sweden** arranges a seminar or an educational visit for journalists at the agency. **Reporters** are invited to participate in a **seminar** entitled “How to find facts in Swedish statistics”, “How to find what you are looking for in Statistics”, or “Finding answers on questions you have never asked” or topics similar to those.*

*Journalists in Sweden are educated to their profession at the University of Stockholm and Gothenburg. Most of the courses have an introduction **how to use databases**. Some years Statistics Sweden had the opportunity to show the students how to use statistics in their future jobs. These kinds of educational opportunities are specially designed for students and the agency benefits to brief the future journalists how to use statistics.*

***Statistics Finland** educates journalists in **three different situations**. Most often an individual journalist or a small group of journalists are invited to visit Statistics Finland to learn how it operates. The **visit** takes half a day either in office hours or in the evening. The experts of Statistics*

Finland give presentations of up-to-date problems and discussion is lively. The result from such meetings has been good personal relations, plus one or two **joint projects**.

The second type of education situation is to hold **background information seminars**. A large number of journalists are invited. The seminars are arranged once or twice a year, depending on the need. The seminars are announced when major changes, which the journalists should know about but which are not particularly newsworthy, take place in statistics.

Chargeable courses for groups of journalist constitute the third type of education opportunity. The biggest media house in Finland has included these two-day courses in the training of its economics reporters. The result is a higher level of statistical sophistication within the journalistic profession.

6.5 (TO DEMONSTRATE POWER AND BEAUTY OF STATISTICS) How are statistical offices promoting statistical literacy among news media and the public?

6.5.1 Promotion of statistical literacy

In this era of instantaneous and global information dissemination, it is increasingly easy to make greater and greater **amounts of data available to the user**. However, the precepts of good customer service say that statistics owe the users of our data more than just easy access: best efforts are to be made them **more knowledgeable and literate about statistics** and to make statistical information easier to understand.

Making statistics more understandable

Statistics can be made more understandable by educating those who develop statistical information and by product development, i.e. making the products and services easier to access and understand.

To make statistics more understandable, a statistical organization has to 1) train its subject-matter specialists and 2) make available supporting documentation and tools for them when they prepare material for the users of statistics. Education of statistical staff in writing and presentation skills is a vital part of statistical dissemination.

Statisticians need supporting **guidelines for their contacts with the public**. These guidelines usually deal with procedures for releasing information, but they also should provide help in respect of other communication with the public.

*The guidelines of **Statistics Canada** outline **keys to an effective release** and provide a framework for analysis. They call for explaining the importance and relevance of the data and discuss what this new information adds to the public's understanding of important issues in society.*

***Statistics Finland** published the second, extended version of guidelines on **how to release statistics**. It describes the basic rules and procedures to be followed, gives checklists for the different performers in the releasing process, such as the statistical expert, information officer, reviewer, etc. In conjunction with the guide, **templates for press releases** have been published in Statistics Finland's intranet. General guidelines for communicating with clients have, similarly, been agreed upon within the organization.*

*In addition to the traditional elements of the editorial process the **US Bureau of Justice Statistics Style Guide** <http://www.ojp.usdoj.gov/pub/bjs/pdf/bjssg.pdf> contains instructions about writing and **presenting data for ease of use**. Authors are expected to begin their creative process by asking whether their findings are worth reporting. It contains standards for writing in a journalistic style and constructing easy-to-understand tables and graphics. This guide is required reading for all authors.*

The Intranet site of the **US Census Bureau** Public Information Office provides tips for analysts in dealing with the media.

One tool that The **US Bureau of Labor Statistics** has used to make sure that basic documents are not written at too high a level for understanding by the general public is the grammar checking functions of the agency's word processing program. By checking and adjusting the grade level results of documents, authors can correctly position a written product for its target audience. The *BLS Customer Service Guide* is continually improved based on comments from the public.

Easy public access to statistical information

The Internet is the most important, as well as rapidly developing, medium for making statistics more accessible.

There are other, more traditional means of access, which must not be forgotten. *The Canadian public, for example, has free access to all of Statistics Canada's publications at some 50 libraries across the country, or at any of the nine regional Statistics Canada Reference Centers. Canadians can also phone a toll-free number from anywhere in Canada during regular business hours to obtain basic data for free.*

Role of meta-data

Making statistical information easily accessible will lead to increase statistical literacy. In addition to access to statistical data sites, access to information content is also important: there is great demand for information on how to interpret and use statistics, i.e. **meta-data**.

Meta-data is, and will continue to be, the most difficult challenge facing users of statistical data on the web, which makes it much easier **to use data in both the wrong and the right way**. Only high quality and target group-oriented meta-data, closely coupled with real data, can stop statistical anarchy. Meta-data issues are being addressed throughout the statistical community.

Means to convey metadata

Statistics Canada has made available on its Internet web site a browsable **corporate meta-information system**, which includes detailed descriptions of individual surveys, indicating variables or subjects covered, definitions and methodology used and data quality indicators. *With this system, users can make their own decisions* about which statistical sources best meet their needs and will help users better understand the statistical data produced.

It is worth noting that each release in Statistics Canada's The Daily now identifies not only a contact for more information about the release, but also a contact for more information about the quality of the data and the concepts and methods used.

*The **US Bureau of Labor Statistics** uses the Internet as another forum to assist the public in understanding data. Every program's home page includes an overview of the program, frequently asked questions, and a list of contacts who can answer questions.*

*The **US Energy Information Administration** has undertaken a multi-year effort to ensure common and accurate data definitions. The organization felt that, because it serves a broad customer base, multiple definitions might confuse some users, particularly new ones.*

*EIA's data definitions originally were developed for survey respondents and a technical audience. A Common Data Definitions Team of EIA staff members identified more than **200 terms with more than one definition**. Multiple definitions sometimes were actually contradictory, but more often just contained different levels of detail that might confuse users.*

*The **US Bureau of Transportation Statistics** developed a CD-ROM with the American Travel Survey micro-data files along with cross-tabulation software to allow users to create their own tables and graphs. The CD also includes embedded definitions of variables that are accessed by simply clicking on the name of the variable. Data collection documentation on the CD is in a*

hypertext format that allows users to easily find specific data quality information by clicking on the hyperlinks.

Product development

There is much need for product development-oriented research on both user interfaces and the needs of customers.

When launching new products, **Statistics Finland** habitually conducts a “market research survey”, trying to get information on what kinds of needs the users have and what the best media would be for delivering the information to them. These surveys have shown that **clients want international comparisons** based on many different statistics and, although they are willing to use the Internet as the medium, paper publications are still needed alongside the web. This strategy has proven its power to the extent that the new “**multiple-media**” product family containing international and time series data has been very successful.

The **US National Center for Health Statistics** has conducted a number of cognitive research projects to test how well data users understand and can read maps, charts and other graphics produced by NCHS as well as other data producers.

NCHS tested the best ways to show the range of values, the best way to show the variation in legends in the maps, and the best colors for readability and understandability. These cognitive research sessions were held sometimes as adjuncts to NCHS meetings and sometimes in the exhibit areas of major professional meetings. The **research results** were then used to develop new products or refine and modify existing ones.

NCHS research staff also conducted one on one interview session with representatives from a variety of organizations to gain feedback on the clarity of presentation of data in the first annual report, *America's Children*. Focus groups, users surveys, and other mechanisms for feedback have provided useful information to improve the presentation of data.

The **US Energy Information Administration** has initiated three projects to redesign specific survey forms, all using a new technique called **cognitive interviewing**. This process involves a respondent actually filling out a survey with an interviewer while “thinking out loud.” In that way, the interviewer can see how the respondent interacts with the questionnaire, navigates through the questions, and calculates the data, and what meanings the respondent gets from terms and instructions.

The forms in question involve manufacturing energy consumption, electric power, and natural gas. In the case of manufacturing energy consumption, the existing survey form was in an **intimidating matrix format**, with a separate instruction booklet. The **revised version** is much longer (50 pages versus 10 pages) but has an **intuitive design**, efficient skip patters that allow respondents to skip entire sections, directive use of color and shading, and instructions printed throughout the survey, precisely in the places where respondents need to read them.

Educating the Users

Educating the users is a core method in **promoting statistical literacy**. Although the educational sector bears the main responsibility for statistical education, statistical organizations have their own opportunities, too. They can arrange lectures and seminars, and publish books, brochures and Internet pages.

At least a part of the education should be provided free of charge, although there are also possibilities for chargeable education. The education can be built on the products of the statistical organization, but also the expertise of the organization should be used. Lecturing is also a good exercise in public presentation for the experts of statistical office.

1. User-training workshops

In Canada, Regional Reference Centers organize user-training workshops on a regular basis to introduce and demonstrate **Statistics Canada's** products and services and explain concepts and the use of statistical data. Public relations staff organizes regular presentations **for the benefit of**

Members of Parliament and their staff about selected agency statistical programs so that they can better understand the significance of the data.

2. Customer training

***Statistics Finland** has a special unit for customer training. It organizes about 40 courses a year. The number of students in one year is about one thousand. The courses are marketed to private companies and public organizations. A basic 2,5 day course on statistical literacy is also organized annually.*

3. Education for librarians

***Statistics Sweden** arranges courses and other kinds of education on statistical literacy: courses on databases, courses for librarians, courses for major customers.*

*Not only data in the **databases** have been **looked upon as hard** to access. Also the **technique can cause problems** for the users not updated on the software. In order to avoid those problems, courses have been arranged for various groups of users in how to find and how to use data in the databases of Statistics Sweden.*

*For librarians-to-be as well as for library staff at university libraries, courses are arranged where thorough information is given on what kind of statistics Statistics Sweden produces, where to find it and how to use it. **Education of librarians is of strategic importance**, as they in their profession meet a lot of people who can take part of their knowledge.*

Statistical literacy is of foremost importance for the major customers and users of statistics. By having close contacts with those groups, different courses and seminars on statistical literacy can be developed and offered. For example, staff at trade unions and staff from the Swedish Government Office have taken part of that kind of education arranged by Statistics Sweden.

*Statistics Sweden **charges a fee** for that kind of education. No marketing is performed concerning that kind of education.*

4. Networks opened

*The **US National Center for Education Statistics** Fellows Program is a weeklong overview of the statistical standards, data collections and products of NCES. It is designed to provide information about NCES to data providers and users, to open networks of communication among participants, and to give NCES feedback on how we can better meet the needs of our customers. One of the **conditions of acceptance** to the program is that each Fellow agree to **act as an “emissary”** for NCES by dedicating hours during the six months after the Fellows Program to inform his or her colleagues about the work of NCES. Generally fellows are from elementary/secondary education, post secondary education, or library programs.*

Another NCES training program for external data users promotes the effective and correct use of NCES data. Data users include faculty members and graduate students in higher education institutions, as well as researchers and data analysts at the state and local education agencies, professional associations, and other Federal agencies. This training program offers seminars on the use of NCES databases usually in the summer each year. Each seminar is four to five days long during which participants learn how to access and analyze NCES data properly and correctly. They also review certain statistical topics such as sample design, variance estimation, imputation, sampling weights, and their use in analyses. In addition to this program, NCES frequently conducts training seminars for data users at the annual meetings of professional associations such as the American Education Research Association, and the Association for Institutional Researchers, and at conferences such as the Annual Summer Data Conference and the Management Information Systems Conference (<http://www.nces.ed.gov/conferences>).

Books, articles, brochures, web sites employed

*Statistical organizations publish a large number of books, articles and brochures and develop web pages **aimed at improving statistical literacy**. In our list there are three types of publications: basic publications on statistical thinking (Finland, Sweden), popularized metadata on some statistical data (US), and popularized statistical publications (US). The last mentioned publication*

type is crucial if we intend to win over new groups of users of statistics. The Internet has also opened possibilities for contacting new groups (e.g. kids' pages).

Statistics Canada publishes various books and brochures targeted at the general public that contribute to improving statistical literacy. *Statistics Canada: A Window on the Nation*, *The Canada Yearbook* and *Canada: A Portrait* are examples.

Statistics Finland has published a book on basic statistical knowledge. The book runs through the central statistical definitions and theory, gives an overview of the Finnish statistical system and of how different statistics are compiled. A diskette with data for exercises is attached to the book. It is used as a textbook in tertiary level education and in Statistics Finland's own customer training. Statistics Finland has also published a **brochure for those in need of survey data**. The brochure indicates which basic quality dimensions one should identify in survey data.

A book on statistical graphics is due out soon. It is based on over one hundred short stories in Statistics Finland's monthly bulletin on statistical graphics. The book explains the grounds for the theory of statistical graphics, the basic types of graphs, the main errors in their use and the principles for producing good graphics.

A "Statistical school" was introduced in a quarterly bulletin on welfare issues to meet the demand of customer education in Sweden. This is a journal published by **Statistics Sweden** containing articles on living conditions in the Swedish society. The authors of all articles are statisticians, specialized on statistical methodology, although the articles are written at a basic level to enable readers without statistical schooling to understand the contents.

In several issues of Statistics Sweden's **journal for customers** you can find short notes and articles with explanations of concepts within the statistical area under the heading "Statistical know-how." Statistics Sweden also has published a few books, contributing to the understanding of statistics. Emanating from the series of articles in the journal on welfare a few **booklets** was produced within the field of statistical literacy.

The **US Bureau of the Census** publishes for the general public a **newsletter** *Census and You* (published for the past 33 years) and *Census Briefs* (two page summaries of findings on key topics, in operation for the past 12 years)

(<http://www.census.gov/pubinfo/www/news.html>). They are written in a popular style, with the non-technical audience in mind. One special feature is the use of simple graphs, tables and US maps to display data. *We Asked/You Told Us* is a series of **two page explanations** of the questions we asked in the 1990 census. These two pagers explain why Census asked the question and summarize key results. We the

People, a **series of short booklets** done after the last three censuses, summarize trends on various groups.

The **US Bureau of Economic Analysis** has published materials providing **lay explanations** of National Income and Product Accounts (<http://www.bea.gov>). These materials are suitable for and are widely used in freshman level economics courses.

Several **US Bureau of Justice Statistics** products have been created for wide public consumption. *The Nation's Two Crime Measures* (<http://www.ojp.usdoj.gov/bjs/abstract/ntmc.htm>) is a two-page Department of Justice **statement** that describes the purposes and advantages of the Uniform Crime Reports of the FBI and the National Crime Victimization Survey of the Bureau of Justice Statistics. After summarizing the collection methods that the two statistical programs use and highlighting the aspects of crime that each measures, the statement concludes with similarities and differences.

The National Crime Victimization Survey was redesigned and the new methodology was systematically field tested and introduced starting in 1989. The first annual results from the redesigned survey were published for 1993 in *Redesign of the National Crime Victimization Survey* (http://www.ojp.usdoj.gov/bjs/cvict_rd.htm). This Web page and supporting material were intended to explain the redesign and its effects on the data to non-technical audiences.

Displaying Violent Crime Trends Using Estimates from the National Crime Victimization Survey (<http://www.ojp.usdoj.gov/bjs/abstract/dvctue.htm>) is intended for an audience that is not trained in statistics. This report graphically presents violent crime trends from the National Crime Victimization Survey and the error surrounding the estimates. Included in this report are new graphical methods for presenting error designed to allow readers to **easily visualize concepts** like statistical significance. The report discusses sampling, statistical significance, and statistical inference and includes additional information on basic statistical principles. The genesis of this report was the need to **explain to policymakers** why, although there was a difference in the violent crime rate estimates from one year to another, it could not be concluded that violent crime rates had changed.

The **US Economic Research Service** and **National Agriculture Statistics Service** (along with other US Department of Agriculture agencies) have twice published a **series of handbooks**. NASS a new publication was due to be released (*Understanding USDA Crop Forecasts*) that is intended for broad distribution to data providers and data users. This report is aimed at describing the entire process of preparing the US Department of Agriculture's most sensitive estimates.

The **US National Center for Health Statistics'** annual report on the health of the nation has an extensive **glossary of terms** and a very informative descriptive section on the data sources (<http://www.cdc.gov/nchswww/products/pubs/pubd/hus/hus.htm>). NCHS has also developed fact sheets and other more user-friendly presentations of data, such as a series on women's health, to make the data easier to understand and comprehend (<http://www.cdc.gov>). The NCHS web site has been modified to make data more accessible and understandable in both published and unpublished formats.

The **US Bureau of Labor Statistics** traditionally published a **Handbook of Methods** (<http://www.bls.gov/opub/hom/homhome.htm>) describing in detail the formulas and methodology used to calculate the output of each program; and more comprehensive technical material can be found at the back of each program specific publication. At the other end of the spectrum are products that have made it easier for the general public to understand labor economics data. These include brochures, fact sheets, and pamphlets, some of which have also posted to the BLS Web site. See, for example, *The Consumer Price Index. Why the Published Averages Don't Always Match An Individual's Inflation Experience* (<http://www.bls.gov/cpi>) and *How the Government Measures Unemployment* (<http://www.bls.gov/cps>).

In addition to brochures summarizing individual **US Energy Information Administration** reports, the agency has produced a number of **brochures** that aim to increase public understanding of energy topics.

Some present a clear overview of a complex issue (*Restructuring of the Electric Power Industry*) or provide a convenient summary of the most important energy statistics (*Energy INFO card*). Others can be a primer or tutorial on a specific energy subject (*Greenhouse Gases, Global Climate Change and Energy*) (<http://www.eia.doe.gov/bookshelf.html>).

Educating the Media to Use Statistics in the Right Way

Communication with the media is based on a system of news releases. If the releases are written in a clear and journalistic style, and have the definitions and contact information in them, they comply with the compulsory requirements. However, statistical organizations can do much more to improve the **statistical literacy of journalists**: various types of training and seminars, as well as informal contacts will, for their part, increase journalists' insight into the complexities of statistical presentation. Daily contacts with journalists should also benefit statistical literacy education.

The news media have been identified as the primary audience for releases in *The Daily of **Statistics Canada***. Releases are written for the general news journalists, who are not specialists in statistics or economics either.

Journalists, as the general public, do not readily understand the significance and limitations of statistics. If *The Daily* communicates effectively – that is using plain language, avoiding anything that is too technical for most readers. It will also most probably contribute to “educating” them. The **insertion of definitions and notes** to readers in *The Daily* releases to explain the methodology and limitations of the data have also proven effective in “educating” the media. Also, journalists know that they can phone Statistics Canada’s media hotline.

A **glossary of terms** used at Statistics Canada was also developed, it is available on the agency's site.

In press releases from **Statistics Sweden**, **explanations** of words and **definitions** are given as well as definitions of unavoidable statistical concepts as a guide for the journalists who will rewrite them.

The **US Bureau of the Census** is engaged in a number of activities designed to improve media use of Census information. First, press releases and reports (<http://www.census.gov/pubinf/www>) are being written in a shorter and more succinct form. Second, for key data releases (e.g., income and poverty and educational attainment), Census prepares separate releases for population subgroups (e.g., Hispanics). The belief is that the better all groups of citizens understand the data, the more likely they are to respond.

Other products designed for **media consumption**: Census Bureau Facts for Features (<http://www.census.gov>) are twice monthly summaries of facts on specific occasions (e.g. Mother's Day and Black History Month), written in plain language for reporters with tight deadlines to meet; Profile America, a CD ROM shipped free to radio programmers each month, includes audio news items based on Census Bureau data for each business day of the month; and the Bureau publishes a series of Census 2000 fact sheets and drop in articles to enable reporters to better understand and write about the decennial census <http://www.census.gov>.

Journalists covering the Census Bureau are invited to “**brown bag lunches**” conference presentations, classroom demonstrations, and other outreach gatherings. Census media specialists are sent into the field to assist reporters in finding the local angle in our preparation for the decennial census.

The **US Bureau of Economic Analysis** staff who interact with the media are required to **attend workshops** that focus on both media needs for comprehensible, timely statistics and on the agency's need to ensure that complex concepts are communicated to the media in a manner that promotes accurate, effective reporting. BEA also conducts media background briefings (which are not intended to be newsworthy) to explain upcoming changes in the agency's reporting program and to **educate reporters** on basic concepts such as “seasonal adjustment” and “benchmarking.”

The **US Energy Information Administration** has in recent years emphasized a broader dissemination of energy information through the EIA Web site and through major newspapers and broadcast media. EIA has doubled the yearly number of press releases and press conferences, and has developing detailed guidelines for preparing good press releases.

Authors are urged to avoid overly technical terms and too much detail.

EIA has established a **media relations seminar program**, where working journalists (print and broadcast) and media experts can discuss their needs and expectations for our information with staff members.

The **US National Center for Health Statistics** fields hundreds of media requests monthly and looks at each inquiry as an opportunity to educate reporters. Special education activities are carried out for specific purposes (for example, the introduction of a new standard population for age adjusting). Advance materials to introduce the concept and explain the change and the implications on data are provided in articles and fact sheets and through the Internet.

6.5.2 Teaching statistics in secondary schools

6.5.2.1 Cooperating with the Education Sector

In the long term, cooperation with the education sector should have a priority role in the improvement of statistical literacy. In most countries, schools alone have not been very successful in improving statistical literacy. Statistical organizations have a role to bring practical thinking to the curricula and in providing data for the students' use. Because of the **difficulty of the subject**, cooperation between statistical organizations and educational institutions presupposes thorough and **interactive communication** between them, and students and teachers. This cooperation often suffers from problems due to shortage of financial resources. The pricing strategies of statistical organizations should, therefore, be very flexible where the education sector is concerned. The Internet does offer good and cost effective alternative solutions.

On-line manuals

Statistics Canada actively supports education in Canada by developing and offering easy access to a wide variety of statistical products and services, which have been specifically designed for students and teachers.

Students account for 22% of all visitors to Statistics Canada's Internet web site, and academics account for another 10%.

The Agency has a long-standing practice of giving **privileged status to the education** sector. For years, it has offered a 30% discount on publications to educational institutions and a 70% discount for out-of-date publications; it has also provided its CANSIM University Database at reasonable prices.

Statistics Canada is working to support educators and students in their teaching, learning and research through an increasing number of programs, products and services:

Canadian universities and colleges can take advantage of the **Data Liberation Initiative (DLI)**, which offers systematic and affordable access to a vast collection of electronic data files and databases for the purposes of academic teaching and social and economic research. The DLI is a co-operative five-year pilot project involving Statistics Canada, a few other Canadian government departments, the Humanities and Social Science Federation of Canada, the Canadian Association of Research Libraries, the Canadian Association of Public Data Users and the Canadian Association of Small University Libraries.

Statistics Canada's University Liaison Program helps university instructors identify Statistics Canada information and products for use in lectures and course assignments. The program is serving faculties of education and selected social science departments throughout Canada.

Examples of course assignments and teaching activities developed through this program include: Integrating databases in the education curriculum; Urban economics; Using Canadian data in curriculum courses; Exploring one's practicum community.

The program has established various **awards** aimed at recognizing and promoting excellence in curriculum development and research and encouraging development, use and enhancement of Statistics Canada products.

Mainly targeted to the high school community, E-STAT is Statistics Canada's interactive learning tool, available on-line or on CD-ROM for Windows, MAC or DOS based systems. It combines user-friendly mapping and charting software with census and time series data. This product was developed with the help of education faculty students from various universities. This product is available at a subsidized price in many part of Canada.

Interactive exercises

Statistics Canada has developed teachers' kits and lesson plans to accompany selected publications or introduce specific data sets, such as the following: Canada Year Book, Canadian Agriculture at a Glance, Canadian Social Trends, 1996 Census results, and Human Activity and the Environment. Interactive exercises focusing on data analysis and survey skills are also made available to the education community. Examples of currently available teaching activities include: Canada at a glance; comparing the health and lifestyles of 13 year-olds around the world; enviro-quiz; graphing in the information age; introduction to population statistics; neighborhood statistics;

smoking today - smoking tomorrow; successful resource-based learning strategies for the Geography of Canada course; and using the Statistics Canada Daily to write a newspaper style article.

An **Educator Discussion Forum** has been set up on Statistics Canada's **web site** so that educators at all levels can share ideas on the use of Canadian statistical information in teaching and learning, and comment on the use of educator resource materials developed by the Agency. This feedback contributes to the development of materials that reflect the needs of the education community.

Some of Statistics Canada's Internet products, used by teachers and students, also serve an educational role. One is the Statistical Profile of Canadian Communities contains free information collected from the 1996 Census of Population for close to 6,000 communities in Canada. Another popular one is Canadian Statistics, which is comprised of more than 350 tables covering all aspects of the Canadian economy and society.

As observed from the list of programs, products and services to the education sector, Statistics Canada's Internet site is used considerably to educate Canadians. A distinct module designed specifically for the educational community, called Education Resources, has been created and can be accessed directly on Statistics Canada's main Internet home page. New data and products and services intended for the education sector are loaded regularly on the Agency's web site.

Flags as flagships of statistics

Statistics Finland has published some products especially **targeted to the different levels of education**. For the primary education level, Statistics Finland publishes every second year a poster (Flag Poster) of the flags and basic statistical figures of all of the independent countries of the world. For the secondary level, Statistics Finland has published a book (Small Book of the World) with thematic maps, graphics, text and tables on the world. For the tertiary level there are many products, which can be utilized in teaching – a book on the elementary statistical concepts and methods and the Finnish statistical system is one example. There is a charge for these products. For public relations purposes, free lectures introducing Statistics Finland and the Finnish statistical system are given in different secondary and tertiary level educational institutions, or to their students at Statistics Finland.

For the past three censuses, the **US Bureau of the Census** has disseminated teachers' and curriculum materials to educate America's children at all levels about the population and housing census. For Census 2000 the Bureau has contracted with Scholastic, Inc., a major company in the development of educational materials, to undertake a much more ambitious effort than in any of the previous censuses.

Kid's pages

The **US Bureau of Labor Statistics** has developed one Web site specifically geared to elementary age children BLS Career Guidance Information (http://www.bls.gov/k12/html/edu_over.htm). This is an adaptation of the popular Occupational Outlook Handbook, which is targeted to a high school audience.

The **US Energy Information Administration** Kid's Page (<http://www.eia.doe.gov/kids/>) is a site where students grades 3 through 8 can come to learn about energy. The site was developed in 1998 by EIA staff involved in an energy studies program. The object of the project was to develop a way to improve communication with energy educators and students. The site includes separate sections for each energy source (like oil, coal, and solar), an energy quiz, fun facts about energy, and descriptions of trips to various energy sites (like a coal mine, a nuclear power plant, and an oil refinery).

Before release to the public, EIA asked the National Energy Education Development Project, a national network of students, educators, and leaders in government and industry dedicated to providing energy programming for school aged children, to make the draft site available for comment to educators and students from school districts across the country. More than 60 teachers and 600 students actually used and evaluated the site and gave EIA extensive feedback.

The **US National Agriculture Statistics Service** have prepared a lesson plan describing the recently completed Census of Agriculture for use in the nationwide "Ag in the Classroom" program (<http://www.reeusda.gov/serd/hep/agclass.htm>), which provides agricultural education materials to State education agencies for distribution throughout the K 12 system. NASS also has a "kid's page" on its Web site (<http://www.usda.gov/nass/nasskids/nasskids.htm>).

Health statistics courses

The **US National Center for Health Statistics** data products are provided without charge to universities participating in special programs to increase the use and understanding of NCHS data. The data sets are then often used as the course material and NCHS staff assists students and faculty in their use.

NCHS provides a free lecture series to universities on a wide array of statistical and health topics. These sessions serve as tutorials as well as present more complex technical information. NCHS conducts a biennial conference of data users to teach those who are using or might use NCHS data. These sessions often include some of the basic background information for understanding the statistical concepts and approaches used in each survey.

The US National Center for Education Statistics offers K-12 Practitioners Circle (<http://www.nces.ed.gov/practitioners/>), a web site oriented to meet the needs of **local education practitioners** such as teachers, administrators, parents, librarians, and counselors. This site presents education data in a user-friendly manner and provides links to other relevant sources. The NCES Fast Facts site (<http://www.nces.ed.gov/fastfacts/index.asp>), which presents many education related questions and answers, relevant tables and data sources, now presents information on all the agency's data access tools, to facilitate data manipulation on the Web.

6.5.2.2 Elementary statistics for first grade students

Introduction The **ALEA** project – Local Action Applied Statistics – is a contribution towards defining new instruments made available to provide support in the teaching of Statistics to Primary and Secondary School students and teachers – setting up a page on the **Portuguese National Statistics Institute, INE**'s web site, creating a CD-ROM and other multimedia products.

This project began as a joint proposal by the **Tomaz Pelayo Secondary School** and **INE**, based on the needs and structures of the parties involved:

- the school has considerable computer resources, namely a multimedia workshop where it edits and produces educational material;
- INE's role in this project consists of **disseminating data** and promoting the use of statistical information intended, in this case, for a specific public. In fact, Statistical Institutes, in carrying out their activity, are responsible not only for producing, disseminating and analysing statistical information but also for ensuring that this information is understood as objectively as possible.

Improving **statistical literacy** is thus an important condition in ensuring the best possible provision of a service of public utility. The **Teaching of Statistics in Primary and Secondary Schools** is one of the most important instruments in achieving this goal.

Net-learning

Virtually no one doubts the importance of using computers in schools. The problem, is in using the computer "in the school system context, as we know it. Students follow the predetermined curriculum, planned from year to year, from lesson to lesson. What is wrong in the educational use of computers is not the fact that it started this way, but that it has crystallized there.

One of the most profound ways of learning occurs when someone attempts to teach someone else what they have just learnt. This is due to the need to repeat what we have assimilated. We retain, on

average, 5% of what we hear, 10% of what we read, 30% of what we see, 50% of what we debate/discuss in groups, 75% of what we do and 90% of what we teach. The issue regarding the future of education, with recourse to these new technologies, may be analysed on four different planes:

□ **School**, which today is limited to the four walls of a classroom, will open its doors to the world and **will be in constant interaction** with other schools, with family and community. **Lessons will be variable** in length, not being limited to the traditional 50 minutes.

□ **Learning** will focus on the **student instead of on the teacher**. It should be based on projects. It will be multi- and interdisciplinary. The Internet may play a vital role here.

□ The **Student** will play an increasingly active role in his/her formation and will no longer be a passive receiver of information. He/she will work together with other schoolmates.

□ The **Teacher** should guide students through the learning process instead of transmitting knowledge. He/she may also share ideas, stimulating participation with other colleagues, wherever they may be. The role of the teacher should be that of the master, such as in the medieval model of the master and his apprentice.

The **Internet** is beginning to offer the **means for generalizing** apprentice societies. In these societies, information is not only found in the repositories of information accessible to the masses, but also in the collective mind of their citizens. These are societies in which, in addition to resorting to schools and to the growing supply of intellectual industries, it is possible to create knowledge through the **use of networks** in a **cumulative process** of mutual aid and the **shared perception of problems** and needs. The type of learning developed by the Internet in literature is called “co-operative learning”.

Schools and Teaching Statistics

The teaching of statistics was included in the “O” level (7th, 8th and 9th year) and A-level (10th and 11th year) Mathematics syllabus in 1999. Initial topics (the gathering and organisation of data, data representation and interpretation, measures of central tendency and probability calculation) are taught at the primary school level while in secondary school, students are introduced to more elaborate concepts such as inductive statistics.

The **ALEA project**, taking advantage of its complementary character in relation to the classic concept of the lesson, is equipped to satisfy the new paradigms of teaching Statistics. Introductory courses are organized as follows:

1. are based on the logic of the survey;
2. use statistical methods and concepts;
3. are presented in a standard order;
4. the teacher does most of the talking.

There are current examples of introductory courses in Statistics whose structure is based on presenting time series, planning experiments and analysing variance, multivariate descriptive statistics or regression analysis. The structure of the course may substitute a never-changing sequence of methods and concepts with a series of applied questions. After analyzing the curricula of several **introductory courses in statistics**, certain authors claim that there are four paradigms in teaching Statistics:

1. Statistics as a branch of Mathematics;
2. as data analysis;
3. as experience planning;
4. as a problem-based matter.

Adopting this last paradigm implies that statistical methods would be used to define a data set and not the other way round. This perspective would make it possible to organize the course as a series of applied problems, problems that could very well be taken from news items with a statistical content found in the mass media. In this sense, the ALEA project aims to create a place where both **teachers and students can take part in solving** day-to-day problems giving rise to reflections of a statistical nature.

*Certain authors defend that it is **not necessary to follow any standard** order in these courses: descriptive statistics, tests, confidence intervals, etc. For example, they could begin by simply using dichotomized variables, thus involving the students from the very beginning in a series of activities generally reputed to be essential in the learning, active planning and data collection process in order to answer questions of real interest.*

Methods of teaching statistics

There are courses in which it is suggested that the students **read the texts before the lessons**, during which only questions regarding the data sets to analyze are discussed. From this perspective, lesson time is used to discover statistical principles and apply statistical techniques. Thus, the students are asked to analyze and use authentic data, some gleaned from available sources and other through class surveys or experiments. The ALEA project, by placing a vast quantity of available official statistical information at the disposal of the students and by allowing the students to create their own documented databases, complies with this objective.

One should know that planning a statistics **introductory course is not a linear process**. Towards this end, it is necessary to consider the goals of the course, the resources available as well as the limitations arising from institutional policy.

The ALEA project, by creating a group discussion space for teachers and students, will make it easier to create the conditions necessary to collectively define and discuss the fundamental characteristics of the course's structure.

Subjects besides mathematics

The failure of many **introductory courses** in Statistics has led certain authors to the belief that they should be redirected – from mathematical technique to data analysis. There are also those who defend changes in teaching methods, replacing passive lessons with lessons in which the students take an active part. The use, as a supplement to theoretical lessons, of a sequence of group projects with oral and written reports on the results obtained is one of the solutions tested. The ALEA project follows this idea and the Internet site has a page reserved for publicising the best reports handed in by the course students – after being duly ‘filtered’ by the teacher.

Many statisticians state that **statistical reasoning must precede statistical methods**. At the introductory level, statistics should not be presented as a branch of mathematics. Good statistics should be identified with purity and mathematical precision, but it is also more closely associated with the careful thinking.

In order to demonstrate **the power, elegance and beauty of the statistical reasoning**, the use of realistic examples of a great variety of courses persuades students that they are using critical thinking skills, which may be applied on a daily basis and in any profession. In this sense, the ALEA project represents an opportunity for using interdisciplinary activities by resorting to and serving other subjects besides Mathematics.

In this aspect, many people have discussed the advantages and disadvantages of comparing the **data produced by the students** with the analysis of data produced by others. While it is true that the latter have a breadth and grasp, many times incomparably greater than what can be produced by the students, they too are not exempt from other effects in the teaching activity. The problem of the examples produced by others is that the **students remain passive** and do not experiment first hand the many questions and problems, which arise from the collection and analysis of data. Thus, it is preferable **to let the students manage their own data**. Activities which take on the form of a project provide the students with experience in formulating questions, defining problems, formulating hypotheses and operational definitions, planning experiments and surveys, collecting data and, regarding the best way to deal with measurement errors, draw up data summaries, analyze them, **how to communicate discoveries** and plan experiments and how to correlate the ideas suggested by the discoveries.

Data collection and analysis is the heart of statistical thinking. Data collection promotes learning by experience and links the learning process to reality.

Developing the statistical reasoning of students consists of incorporating active learning strategies that make it possible to supplement what they have heard and read on statistics, and actually produce statistics.

Experiential learning ('learning by doing') must be supplemented by the written and oral presentation of results. The process of writing about a subject may reinforce and clarify its understanding. It is useful for the projects to be presented by the students to include the proposed objectives, an indication as to how the data was obtained, presenting data based inferences and finally, questions or reserves concerning the conclusions found.

Statistical School-Nets

Some countries with advanced statistical systems, such as *Statistics Canada*, have developed clear educational strategies. Its link to “*SchoolNet*”, an international network of education resources on the Internet, is a good example of this.

The **Australian Bureau of Statistics** (<http://www.statistics.gov.au/>) and its New Zealand counterpart presented, some time ago, a number of pages on the Internet intended for secondary school teachers and students. The *Statistics New Zealand* (<http://www.stats.govt.nz/statsweb.nsf>) even includes a *Census Education Kit* and a newsletter, *StatZig*, designed for a younger public.

In Europe, the Office for National Statistics (ONS) in the **United Kingdom** (<http://www.ons.gov.uk/>) prepared in January 1999, a document outlining its education strategy. This document refers to the creation of a group made up of people from the British statistics institute, teachers, assistants, students and trade associations with a view to contributing towards bringing the ONS and schools closer together.

In **Spain**, the home page of the Instituto Nacional de Estadística site (<http://www.ine.es/>) includes a link to a page for Secondary School Students and Teachers.

In **Portugal**, **Infoline** was created as a new INE service, on line since January 1997 (www.ine.pt). The basic goal of Infoline (INE's on-line Information Service) is to set up a direct line of communication between INE and users of statistical information.

This service enables users to access, on-line through the Internet, a vast number of statistical information tables, published or available for publication, with the greatest disaggregation of geographical data at the parish level, making it a powerful learning tool at the disposal of all those involved in a **school context**.

On the web site of *Statistics Canada*, at <http://www.statcan.ca>, there is a link on the home page to pages with education resources (activities for teachers, e-stat - on-line or CD-ROM access to a selection of electronic data, a page with the statistical profile of Canadian communities, etc.)

Useful Links

Chance Magazine

<http://www.math.mcgill.ca/~chance/>

<http://www.dartmouth.edu/~chance/>

Journal of Statistics Education (JSE):

<http://www.stat.ncsu.edu/info/jse/homepage.html>

WWW RESOURCES FOR TEACHING STATISTICS:

<http://it.stlawu.edu/~rlock/tise98/onepage.html#Section 7.1> (coleção de endereços)

Other links:

<http://www.statsoft.com> (Electronic Statistics Textbook)

Statistics Institutes (with education resources):

<http://www.ine.pt>

<http://www.statcan.ca>

<http://www.statistics.gov.au/>

<http://www.stats.govt.nz/statsweb.nsf>

<http://www.ons.gov.uk/>

<http://www.ine.es/>

PAPERS USED:

- (6.) (Techniques and approaches in training of statisticians...) C13, C5, C21
- 7.1. (Techniques and approaches in statistical training of journalists) G3, P7
- 7.2. (Best practices in statistical training of journalists) C5, P7
- 7.3. (How are statistical offices promoting statistical literacy...) P7, P8