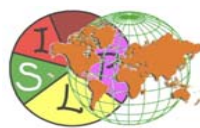


Efforts of Statistical Offices Across the World to Complement Curricula

JSM Denver Colorado

Mary Townsend, ISLP Advisory Committee
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August 6, 2008



Good morning,

I am here as a representative of the ISLP, an activity of the IASE under the umbrella of the ISI. ISLP attempts to encourage statistical literacy in youth around the world and serves to bring together exemplars of materials being to meet this important objective that are used in different countries primarily at the K-12 level. A new online book has recently been released on the ISLP web site which highlights some activities being undertaken by national statistical agencies to support curricula. This book was developed under the guidance of Juana Sanchez the Director of the International Statistical Literacy project. The offices represented here today are Statistics Portugal, Statistics Canada, Statistics Finland, Statistics South Africa, Statistics New Zealand and the Australian Bureau of Statistics. I must point out that these countries were selected because they have programs for Statistical Literacy that have reached highest maturity and that have been most successful and are still being maintained.

I know that here in the United States educators in post secondary or tertiary institutions have gone to great lengths to create materials that help students understand the dry concepts of statistics, making them appealing to students by providing interesting datasets and interactive examples. Many of these materials are used at the high school level as well. Examples of these are Causeweb, Merlot.

What and Why- Official Statistics

- Describes the population, social, economic and cultural aspects of a country.
- Objective statistical information is vital to an open informed society.
- Used by elected representatives, businesses, unions and non-profit organizations, as well as individuals.



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22/09/2008

National statistical agencies take on the important job of collecting compiling, analyzing and disseminating numbers that help us make decisions as a society. For example on how to plan and develop health and social programs that directly affect its citizens now and in the future. Official statistics provide a barometer on the country and help to record and preserve population descriptions as well as heritage and culture data.

Data are used not only used by governments but by business, not for profit organizations and now with the advent of Internet distribution, they are used by the general public in doing their jobs, raising their families and in making purchases. In the past the media were big redistributors of official stats. National agencies were at their mercy in the way the media translated our numbers to the public. Now, Because of direct access by the public through the internet, statistical agencies must ensure that numbers are presented in context and are accompanied by the metadata and methodologies used to collect them. The public needs to understand how to effectively apply the numbers to make informed decisions so, most statistical agencies are getting involved at some level with public stats literacy initiatives. 1

Official vs. Other Summary Statistics, Forbes 2008

Official summary statistics	Other summary statistics and research
Multi-purpose (collect once, used often)	Single Focus (research or policy question)
Participation often mandatory (high response)	Voluntary Participation (lower response rate, potential bias)
Often based on complex survey design	Often designed experiments
Broad coverage (many variables, often high level measures)	In-depth studies
Large scale (provide comparison between groups)	Usually relatively small scale (experiments or surveys)
Often repeated regularly (provide time series)	Mainly cross-sectional (single point of time)
Internationally comparable (agreed standards and classifications)	Relevant to population studied (focused on research or policy question)
Analysis provided by collectors usually simple (single or between two variables)	Sophisticated analysis (multivariate analysis methods used)
Provide primary data source	Can involve secondary data analysis (other data sources)
High cost	Generally lower costs

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Here is a table explaining the difference between official and other summary statistics. I must clarify a bit. An "official statistic" is "a summary statistic of such high quality and relevance that the statistician general has sanctioned its publication." Other summary statistics are, for example, the latest Gallup Poll result, or U of Colorado's percentage graduation rate or the Results of experiments like the percentage improvement obtained from latest drug A over the conventional drug used, etc. All things said, the science of statistics and that is Statistics with a big s like the courses taught in universities or methods used to obtain the "official statistics" is the same as that to obtain the Gallup Poll results, or anybody's summary statistics of experiments and surveys, specialized of course to the context. The "official" adjective should not mislead anyone, it is just a word indicating the origin and importance of the numbers to the nation as a whole, as well as their higher reliability, since trust in government makes people more willing to provide numbers.

What is Statistical Literacy in Official Statistics

- Understanding metadata
- Place statistics in context
- Define data concepts and terms



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What exactly is meant by statistical literacy in official statistics?

Well, releasing more and more detailed data on the internet does not mean that the public is garnering more knowledge from those numbers. The knowledge comes when the numbers are put into context. Often statistical agencies now provide textual analysis which explains the story in the major data releases, they offer information on trends, changes, how the numbers were collected and definitions of statistical terms such as the consumer price index. This all supports the numbers and helps transfer knowledge to the public to make the numbers real and relevant and explain how they can be applied to everyday life to benefit. Statistical agencies are in this way involved in providing informal statistical literacy training at large in official statistics.

1

Why Statistical Agencies are involved in Statistical Literacy Programs

- Increase consumption of our numbers
- Encourage more participation in careers as statisticians
- Better response to surveys



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There are three fundamental reasons why statistical agencies have become involved in formal stats literacy programs. The first is to increase use and better understanding of our numbers. Simply put it is to keep statistical programs viable and data understandable. Some countries offer better metadata and methodologies for this. Examples are Canada, Italy, Finland and Portugal.

Many statistical agencies such as those in Australia, NZ and SA are concerned about replacement of career statisticians or capacity building in human resources. They need statisticians to continue the producing of data. By getting the public and youth understanding the importance of stats and getting then interested in using stats they may be more inclined to choose careers in this area.

In all cases, stats agencies are interested in nurturing a better response to surveys. Stats literacy initiatives help to make the stats system less remote. We rely on the willing cooperation of citizens to provide response to our surveys and the census. It is getting more and more difficult to get response in some areas. If youth learn the importance of data now and understand by applying and using data that good data in mean good data out and that ¹ these data are used for relevant decision making and to form the policies that affect their lives, we may encourage better, more timely and accurate response to our surveys in the future.

Australian Bureau of Statistics (ABS)



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ABS Strategy for Statistical Literacy

1. Data awareness
2. The ability to understand statistical concepts
3. The ability to analyse, interpret and evaluate statistical information
4. The ability to communicate statistical information and understandings

[http://www.abs.gov.au/websitedbs/CaSHome.nsf/home/downloadable+files.e/s/\\$file/Statistical_Literacy_Competencies.pdf](http://www.abs.gov.au/websitedbs/CaSHome.nsf/home/downloadable+files.e/s/$file/Statistical_Literacy_Competencies.pdf)



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The ABS is currently working on a broader strategy for statistical literacy and will be placing more emphasis on this in the future. In past they have essentially implemented a school level strategy. Here are the four criteria that are considered essential by the ABS for statistical literacy in youth. They are:

- Data awareness.
- The ability to understand statistical concepts.
- The ability to analyze, interpret and evaluate statistical information.
- The ability to communicate statistical information and understandings.

For each criterion, a set of competencies has been proposed against which statistical literacy can

be assessed at three different levels in the schools:

- basic (upper primary)
- intermediate (junior secondary)
- advanced (middle and senior secondary).

The Statistical Literacy Competencies can be downloaded as a pdf file from

at the URL shown here. They are a detailed list against which you can compare the activities and resources posted on the website.

Adobe Reader - [ASA 2000.pdf]

Graphing Household Water Use

Table 2 below contains the percentage of household water used in different rooms and places within households in 2000/2001.

Location	NSW	Vic.	Qld	SA	WA	ACT	AUS
Bathroom	26	26	19	15	17	16	20
Toilet	23	19	12	13	11	14	15
Laundry	16	15	10	13	14	10	13
Kitchen	10	5	9	10	8	5	8
Outdoors	25	35	50	50	50	55	44

Note: Data not available for Tasmania and the Northern Territory.
Source: Australian Bureau of Statistics, Water Account, Australia, May 2004 (cat. no. 4610 0)

Ask the students read the table and complete the following questions:

1. Draw a bar graph of household water usage for each state and territory.
2. Compare the NSW and Victoria graphs to the graphs for the other states and territories. Describe any differences.
3. Suggest reasons for the differences between states and territories.
4. Is there sufficient statistical information provided in the table to answer the questions accurately? Why or why not?

• **Graphing State/Territory Water Use**

1. Ask the students to draw five column graphs to compare state and territory water usage for the:
 - 1.1 bathroom
 - 1.2 toilet
 - 1.3 laundry
 - 1.4 kitchen
 - 1.5 outdoors
2. Once students have completed their graphs, have them look at the graph of bathroom water usage. Does the graph suggest that people in WA wash less than people in NSW? Get your students to explain their answer in writing.
3. Ask the students explain which household location seems to have the most consistent water usage across the states and territories.

Graphing the Volume of Water Use

The table below shows the volume of water used per household (KL/household) for the year 2000/2001 and 1996/1997.

Statistics Portugal



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Statistics Portugal won the 2007 ISLP best cooperative project award for its ALEA site, a web site designed to help the general public be more statistically literate.

The website is a partnership of a high school and the national statistics office. It contains lessons on stats and probability, definitions, games and interpretations of the statistical office's most important numbers as well as a fun way for people to access information on the place where they live.

Statistics Portugal is one of the few agencies that contain activities on articles and graphs published by the media and asks students to interpret the information. These are presented in the form of desafios or challenges.

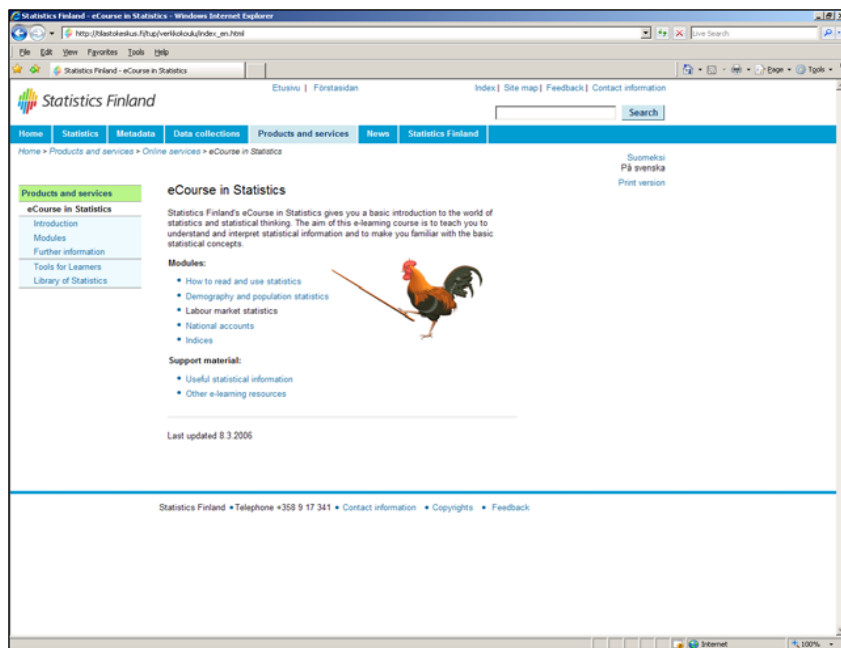


Statistics Finland



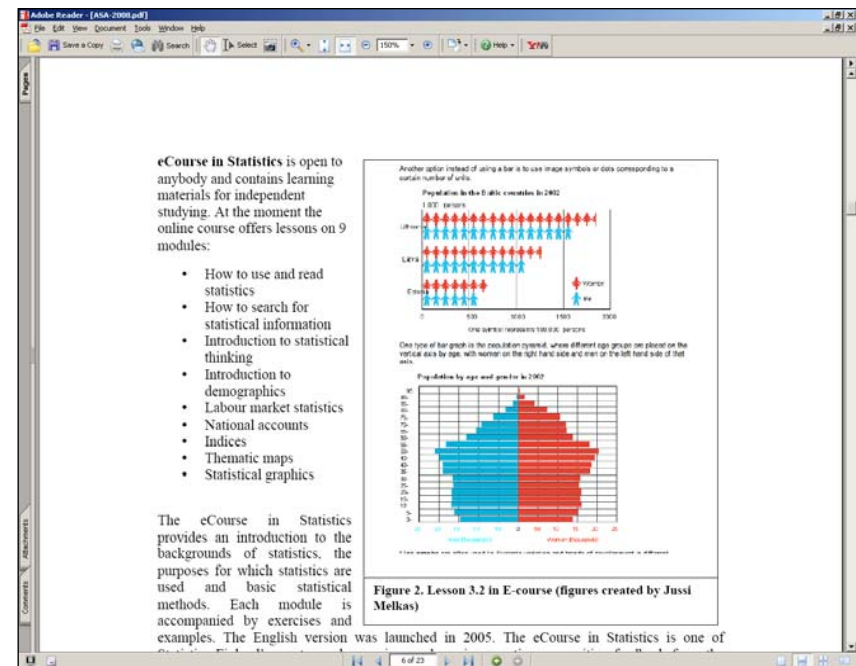
This is an example of a desafio. The graphs in the desafios are from newspapers or magazine articles directly and provide the context for the question in the challenge so they test the readers on the understanding of what they are digesting from the real media.

For example This pie chart or circle graph shows the sales of new music CDs in 2007. The desafios are always topical and interesting subjects to students.



Statistics Finland targets different groups including experts, media and educators. It recognizes that for the public to acquire knowledge from the information provided by the numbers produced at the statistical agency that they must help users understand the metadata and the methodology of the numbers. Partnerships with educational institutions have been established to facilitate professional development of teachers and online resources created to assist the general public. One such resource is the e-course in statistics.

There are 9 modules that demonstrate data concepts from how to use and read statistics to explaining specific data sets and indicators and graphics. Modules are accompanied by exercises and examples.



The population pyramids shown here is an example provided in the e-course which tests students understanding of a histogram.

Statistics New Zealand



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Sample results: Table 4 gives summary statistics that can be used to answer questions 1), 2) and 3). The boxplot given in Figure 4 can also be used to answer 3) and the scatterplot in Figure 5 to answer question 4).

	Total sample	Sample by gender		Total SURF	SURF by gender	
(Records)	(35)	Male(17)	Female(18)	(200)	Male(93)	Female(107)
Mean	40.0	45.5	34.7	33.7	42.1	26.4
Standard deviation	11.9	8.4	12.6	16.2	13.2	14.9
Minimum	6	38	6	2	5	2
Lower quartile	38	40	27	20	39	14
Median	40	40	38.5	40	40	25
Upper Quartile	45	45	42	45	50	40
Maximum	65	65	50	70	70	60

Table 4: Summary statistics of Hours Worked by Gender

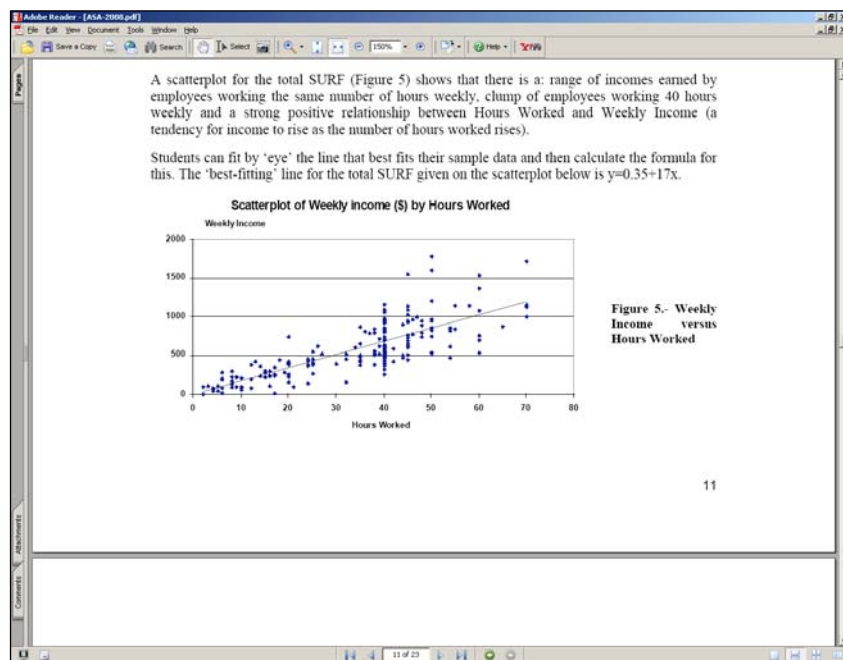
10

Statistics New Zealand has increased its investment in both internal and external statistical literacy training over the last few years. This need for intervention was identified by a lack of capability and recruitment and retention problems. A three pronged strategy has been developed which includes raising the skills of current staff, enhancing the skills of other government agencies and upskilling the public via communities of interest, small businesses and schools.

The schools corner of the website was introduced in the mid 1990s and contains background information to official statistics, tables and links to activities that are curriculum relevant. New Zealand Royal statistical society fellowship teachers helped with the design of the materials on the schools corner.

Stats New Zealand has also created a dataset for use in sophisticated data analysis. It is based on real data from the 2004 Income Supplement to the Household Labour force data. It is called SURF which stands for Synthetic Unit Record File.

Surf has 200 respondents and 7 variables and can be used for a range of activities in the classroom.



Here SURF weekly income by hours worked data are used to help students understand scatterplots and line of best fit.

Statistics South Africa



Like many other developing countries, the main challenge of the national statistical office in South Africa is to increase statistics capacity so their country can have a smooth transition to democracy. In collaboration with the South African Statistical Association and the association for mathematics education in South Africa and the department of education, Statistics South Africa has embarked on a series of activities including Math4Stats.

Math4stats enables learners to understand that statistics is part of everyday life and to enable them to acquire the skills to enter into science, math and engineering fields. There are Math4stats coordinators in all provinces and math educators and subject advisors will be trained this year in this train the trainer exercise. Materials are not yet online.



The next ISI in August 2009 will be held in Durban South Africa. You are all invited. There is a stream at the ISI on stats education. South Africa is also working at bringing in hundreds of teachers for training in conjunction with this conference. It will be a conference within a conference.

Statistics Canada



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Statistical Literacy with Youth

Education Outreach Program built on two pillars:

1. Network of champions
2. Learning Resources website



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Stats Canada I know a little about. Since 1996 I have been the Chief of Education Outreach and developer of the activities and resource with our stats literacy program. The program is based on two pillars, Learning resources website where you can find the data, tools to assist in the classroom and human expertise the second pillar is our network of champions which include 5 dedicated resources and 10 contracted teachers who provided workshops presentations and training across Canada.

Teacher champions



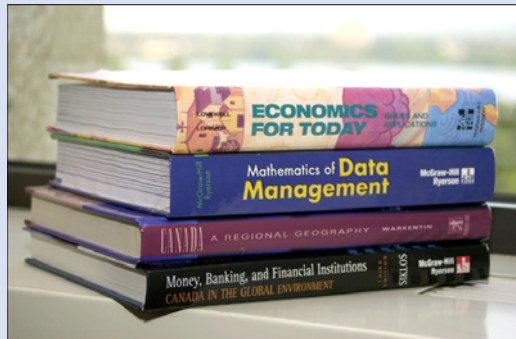
We work with faculties of education getting at teachers before they start their careers, we provide in class workshops and after school presentations for in service teachers. We are available for PD days and at teacher conferences and training sessions.

Classroom Volunteers



We leverage the skills of our own employees by allowing them up to 2 paid hours a week from their regular working hours to visit schools and assist teachers and help kids. We train and screen the employees first. Each year we contribute over 3000 hours of support to schools by mathematicians, economists, statisticians, computer specialists. It is very well received. We have made a big difference in some areas particularly helping those students falling behind to leap forward and

Textbook publishers

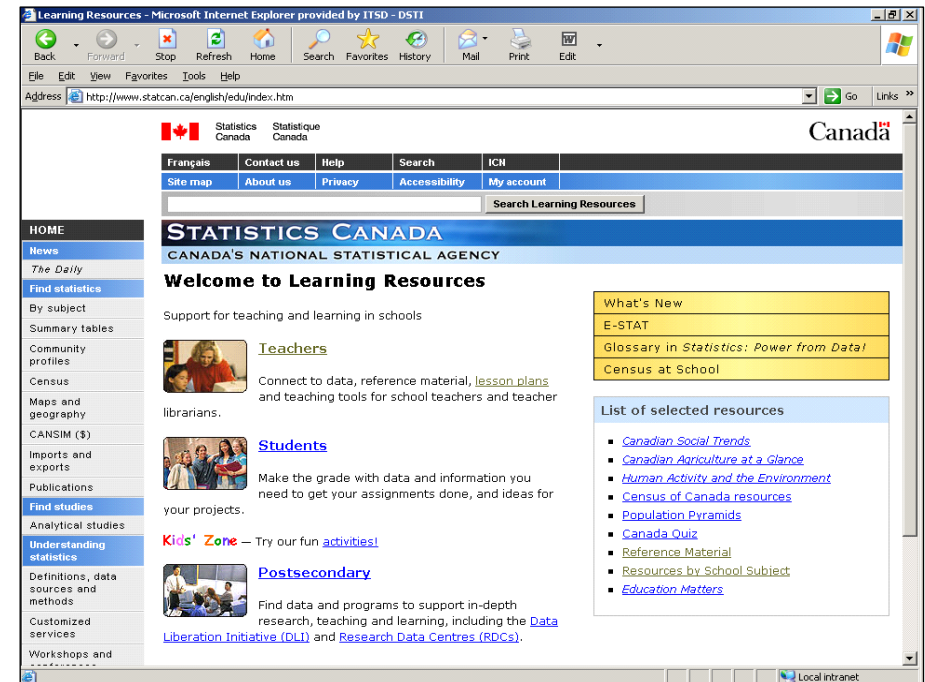


We also proactively approach curriculum consultants and textbook publishers. StatsCan data is now a welcome addition to over 100 textbooks like these shown here.

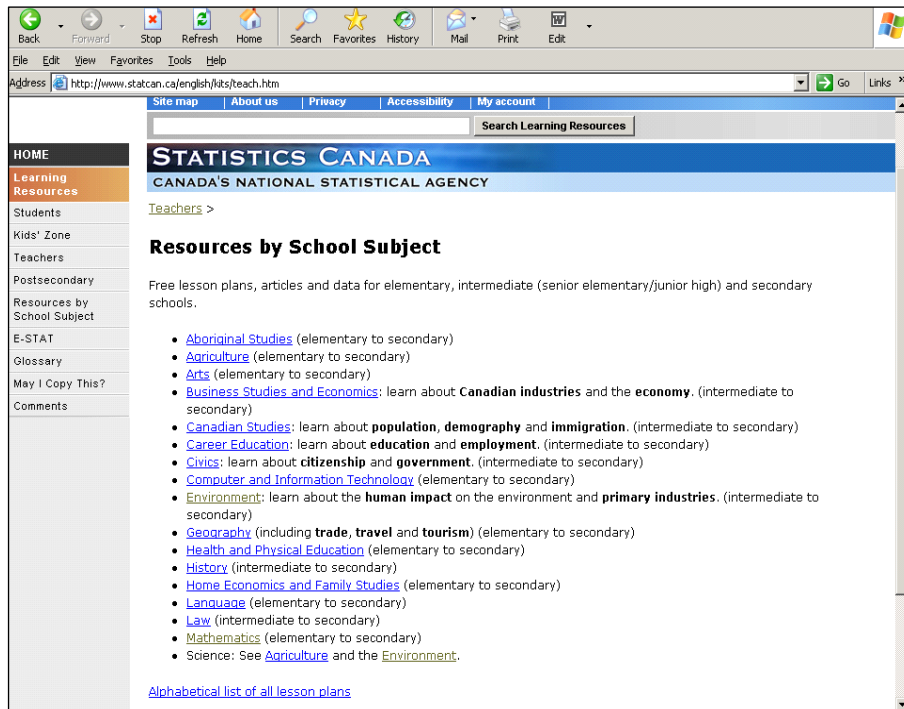
Expert Speakers



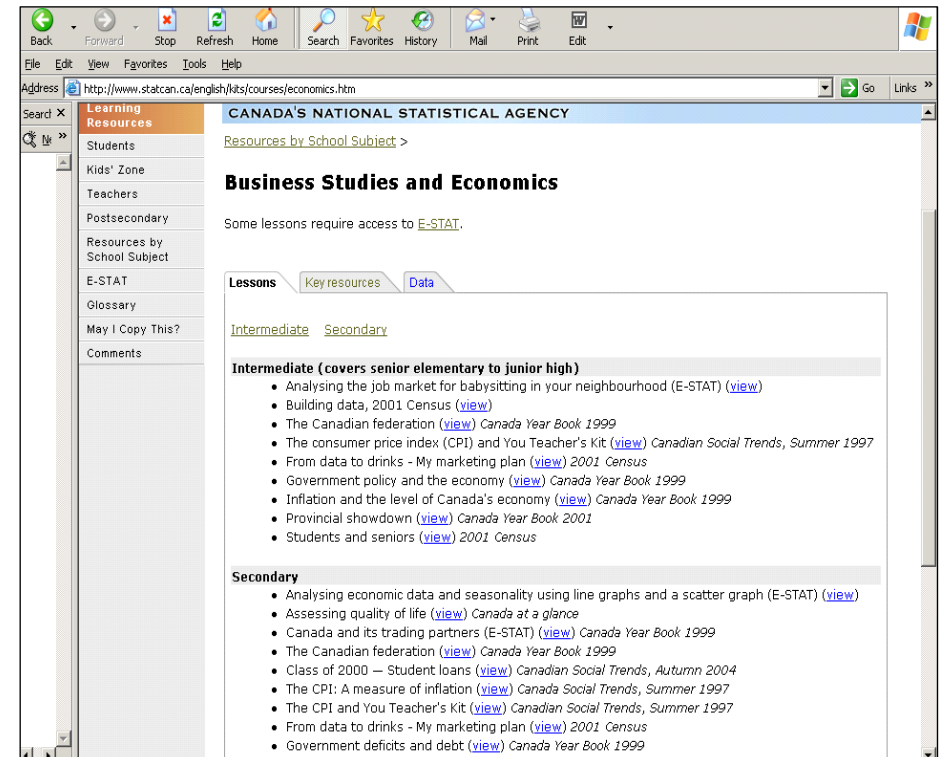
We are often asked to send speakers to the schools to talk about careers in maths and stats or experts in certain data sets like health, environment, trade data etc. When our employees out of town on business, particularly in rural areas we ask them to visit a school and talk about Statistics Canada data or the census. We get good use of our resources like this.



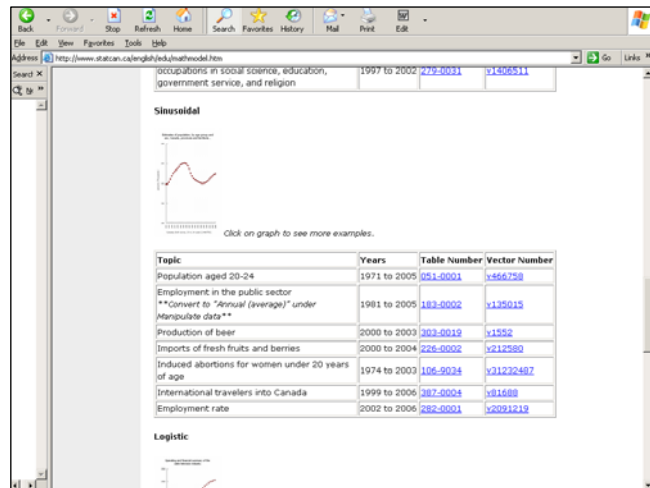
Stats Canada's website hosts hundreds of lessons prepared by teachers for teachers. Over 40 percent of the access to our corporate site is now by teachers and students looking for data to help in their studies. We have special entrances for teachers, students and post secondary. Its a rich resource for educators.



To save time for teachers we have classified our resources by school subject. Clicking on one school subject, resources are broken out by lessons, key resources which contain animations, articles, maps and publications and data.



This is the lessons tab for business studies.



Here you see a data modelling activity. I know you pure statisticians won't be drawn to this but this is a well used section of our site for grades 10 and 11 mathematics.

STATISTICS CANADA
CANADA'S NATIONAL STATISTICAL AGENCY

[Resources for mathematics >](#)

National Longitudinal Survey of Children and Youth for Ages 16-17 (Synthetic Microdata File)

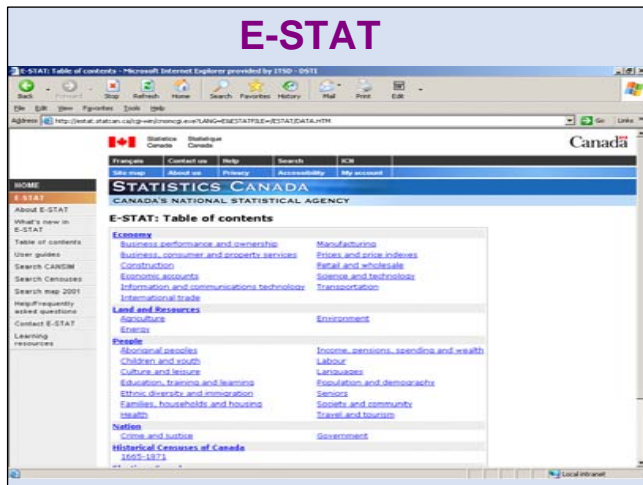
- [Overview](#)
- [Survey documentation](#)
- [Downloading the synthetic microdata file](#)
- [Teacher support materials](#)
- [Lesson plan](#)
- [What teachers are saying](#)
- [For further information](#)

Overview

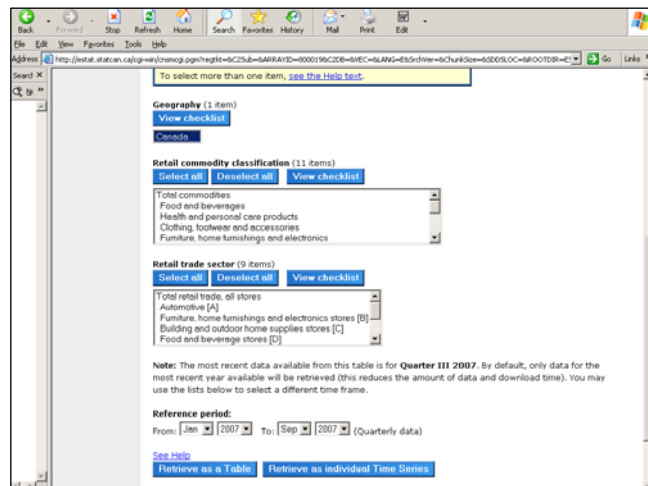
The National Longitudinal Survey of Children and Youth (NLSCY) is a unique study of Canadians from birth to adulthood.

This data file is a synthetic file based on the NLSCY data containing 359 records. It represents 359 youth, approximately one fifth of the 16-17 year old cohort who completed the survey in 2002-2003. In order to preserve confidentiality for the respondents, each record in the synthetic file contains both real and artificial data. Real data are data provided by a respondent, while artificial data are computer-generated plausible values. One of the objectives in creating synthetic records is to identify records with similar pathways through the questionnaire, so that when random swapping is done between these similar records, the resulting synthetic record looks more like a reasonable and likely response. A secondary objective is to preserve, at least approximately, the marginal distributions of variables and the relationships between closely related variables

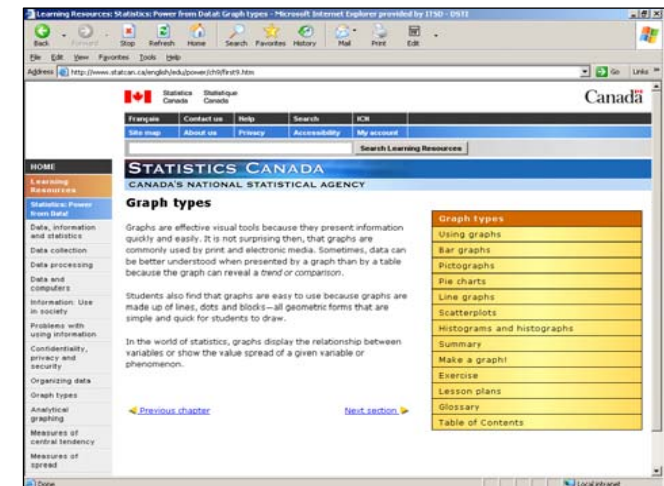
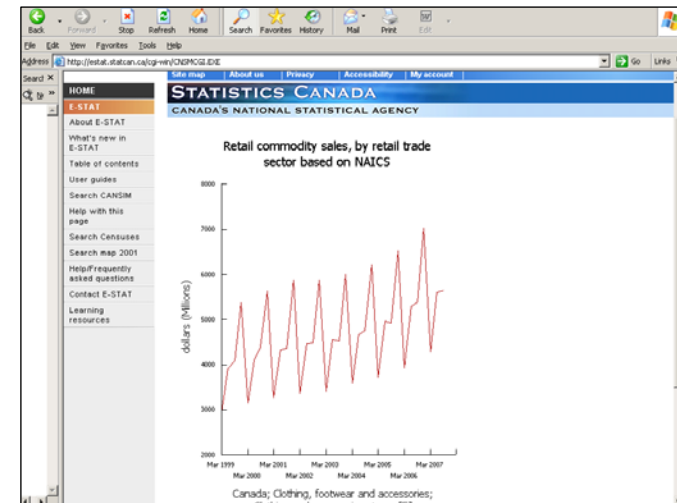
Under the math data tab you would find microdata sets for use in senior data projects along with the documentation and lessons to help use this in the classroom.



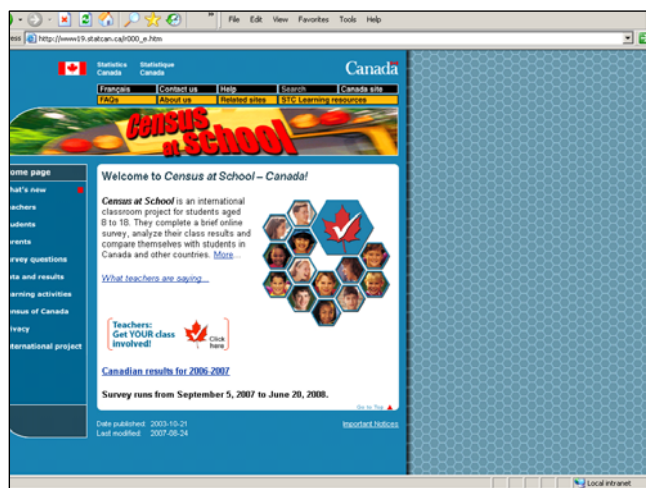
E-stat is our product created for the education community that allows free access with registration to statistics Canada's entire data warehouse. All our social and economic data as well as our most recent detailed census data are available here and can be dynamically mapped or graphed in 13 different outputs.



You can choose tables or times series. Data goes back to 1948 for most sets and we have historic census data back to the first censuses as well.



Statistics: Power from Data! is an online textbook about surveys from start to finish. Thirteen modules offer examples, lessons etc. One of the most popular chapters is on graphing as shown here.



Census at School lets young students collect their own data through an online form to be used back in class with lessons on statistics. It makes statistics real and relevant and is fun for the kids. It lets them act like investigators and shows how data can be used for decision making and exploring. We like to say since they are doing all the steps of a survey from collection to analysis, they are creating little statisticians.

<http://www.stat.auckland.ac.nz/~iase/islp>

Visit the online book:

Government Statistical Offices and
Statistical Literacy



I hope that this presentation whetted your appetite to visit the new online book at the ISLP website. This is a wiki set up so if you know of other activities by statistical offices that are not mentioned here we would like to invite you to spread the word to encourage participation in the book.

Thanks again to Juana Sanchez for her guidance on this. Thank you all for your interest.

International Statistical Literacy Project Home - Windows Internet Explorer

http://www.islp.org/

International Statistical Literacy Project Home

ISLP RESOURCES

- Adults learners and educators
- Activities with Statistics
- Assessment of Statistical Literacy
- Centres for Children
- Definitions of Statistical Literacy
- General Resources on Statistical Literacy
- Media and Journalist Training
- Statistical Offices/Training
- Statistical Offices/Projects
- Teachers/Resources and Training
- By Country (under construction)

THE LATEST...

- Training Course on Statistics Knowledge and Policy
- HP Data activities
- New STM newsletter
- Marketers (please direct)
- StatSmart (Australia)
- ELITE
- OECD Measuring Progress newsletter
- OECD: Statistics
- OECD: Innovative Approaches to Turning Statistics into Knowledge
- Meeting Within a Meeting (MMW)
- The Last OECD Statistics Newsletter is out
- France: State Education conference
- Chance of Rain
- Create a Video on Math and Voting
- NCM resources for Focus of the Year
- South Africa page updated
- USA: Maryland State Assessment tests for High School Algebra and Data Analysis
- OECD: "The Nation of the 19th System of National Accounts: What don't it change?"

WELCOME TO THE ISLP HOME PAGE

The ISLP is a project of the International Statistical Institute. Our objective is to contribute to statistical literacy across the world, among young and adults in all walks of life. To this end, we provide an online repository of educational resources and more. In Statistical Literacy (see left column on this page), international activities to promote these resources and to increase awareness and promote the individuals contributing to statistical literacy (see right column of this page). We do all this with voluntary. For this reason, to make our activities possible, we rely on sponsorship, donations and time and skills volunteered by people interested. If you like our work, please donate to the ISLP by going to the Donations page or volunteer your skills and time. [Contact us](#).

NEW BOOK OF THE ISLP



Government Statistical Offices and Statistical Literacy

A publication of the ISLP

Edited by Joana Resendes

ISLP PUBLICATIONS

Newsletters

Books

Articles

CURRENT ACTIVITIES

INTERNATIONAL STATISTICAL LITERACY COMPETITION for 10-18 years old students

- The National Phase will take place in the first quarter of the year 2009. Registration online is closed.
- Final date
- ESRALD PROGRAM OF STATISTICS SOUTH AFRICA WILL HOST THE FINAL OF THE ISLP STATISTICAL LITERACY COMPETITION



2009 BEST COOPERATIVE PROJECT AWARD IN STATISTICAL LITERACY

- Call for nominations for the 2009 Award. The 2007 Award went to ALEA of Statistics Portugal

ARE YOU STATISTICALLY LITERATE? TRY THE ISLP WEEKLY QUIZZES



Contact: [donors will enter a draw to](#)

Internet Explorer 7.0.5730.11