

# ISTAT'S NEW STRATEGIES TO INCREASE STATISTICAL LITERACY<sup>1</sup>

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## ABSTRACT

*Official statistical information is a public good and therefore should become common heritage in a full sense. One of the fundamental aims of a National Institute of Statistics is to increase people's statistical literacy. In order to achieve this, Istat decided to review its communication and didactic priorities and strategies and to start from young people: they must be considered as one of the key groups towards which new statistical literacy activities should be directed.<sup>2</sup> However, the main difference from the past lies in the idea of using the high computer technology and web 2.0 skills which young people nowadays possess in order to attract them to statistics. Our goal is clear: to increase young people's statistical awareness in order to make them more responsible citizens. Many activities have been already performed and many others are going to be performed.*

*Keywords: statistical literacy, information society, over information.*

## INTRODUCTION

In our information society people who are not able to read and critically evaluate statistics are also not able to be citizens in the full meaning of this term.

Official statistical information is a *public good* and therefore should become common heritage in a full sense. A society of statistically illiterate people is not a fully democratic society. One of the fundamental aims of a National Institute of Statistics is to increase people's *statistical literacy*. This is even more important in our society, where the daily stream of information has never been faster than nowadays, also due to the extremely rapid development of the web.

## ITALIAN SITUATION

Statistical literacy, especially among young people, is at a critical point in Italy. However, this is only part of a more general problem of widespread cultural illiteracy. Last December Pisa 2010 test results were published by the OECD. According to them, 21% of 15-year-old students in Italy show low reading performances: this means that one student out of five in our country can be defined as "semi literate", with regard to reading and writing competencies. This result is really alarming and it requires a deep analysis of the problem and its causes in order to find out the right solutions.

Illiteracy was due in the past to lack of information or difficulties for poor people in reaching a good scholarship. Nowadays, even if situations of this kind still exist because of the general economic crisis, a new, unexpected phenomenon is growing: the new generations are facing the problem of over information. Young people are bombarded with information from all sides and too much information is the same as no information at all. The risk is being no longer able to separate true or important information from false or unnecessary one. In an interview to an important Italian magazine in 2009, Istat President Enrico Giovannini warned about the danger of this kind of "modern illiteracy", where over information leads to the same negative results as lack of information itself.<sup>3</sup> According to him, a too wide amount of information makes people confused and allows illiteracy to grow. This is a matter of democracy: the worst divide of a modern information society is in fact between literate and illiterate people.

Another problem of our country is the digital divide, even if the trend is surely positive with a general growth of ICT in Italian households in 2010.

According to the latest statistics<sup>4</sup>, one household out of two does not have an internet connection and only one out of three has a broadband internet connection. The main reason for not having access to the internet at home is the lack of skills (40.8%); other households consider the internet not useful or not interesting (23.2%) or access it elsewhere (13.2%); others consider equipment costs or access costs too high (18.4%).

An important indicator to measure the digital divide in our country is provided by households with at least a member aged 16-64. In Italy, households with minors are the most technological: 81.8% own a PC, 74.7% have internet access at home and 63% have a broadband access. More specifically, last year 51% of population aged 3 and over used PC and 48.9% of population aged 6 and over surfed the web for several reasons: 78.5% used the web to send/receive emails, 67.7% to learn and 62.8% to find information about goods or services. About one third of the individuals aged 14 and over shopped online in 2010, for the most part to find out travel and vacation accommodations.

With respect to ICT usage, Italy has not succeeded in filling the strong inequalities at territorial level, especially referred to municipalities' size (big cities vs. small ones), and in the European panorama Italy still continues to stay behind most European Union countries, ranking twentieth for both internet access at home (with a 59% percentage of usage in households with at least a member between 16 and 64, compared with the 70% EU-average) and also for broadband access (with a 49% percentage of usage compared with the EU-average of 61%).

Moreover, Italian culture has been traditionally little interested in numbers. This is particularly evident nowadays, considering the low popularity of scientific university studies - such as Mathematics, Physics, Statistics - among young people. Italian Universities are facing a marked drop in applications. Therefore, they are taking initiatives to contrast this negative trend, e.g. largely reducing fees for particularly brilliant schoolchildren.

The poor interest of Italian students towards statistics is also due to the lacking practice of the statistical thinking. Only recently statistics has been included in official school programs, not only in primary schools but also in lower and upper secondary schools; in spite of this, statistics is still scarcely taught. A possible cause could lie behind teachers' professional training, since they do not receive a good preparation in this subject at the University. This means that teachers themselves are not generally interested in statistics. Moreover, even when teachers are interested in teaching statistics, they find another difficulty in the chronic lack of didactic tools at school (i.e. maths books often treat statistics as a secondary subject).

#### WHAT TO DO THEN?

Statistical literacy is extremely important for a society that wants to be "fully democratic". According to expert Milo Schield's opinion,<sup>5</sup> people should become able not only to describe, compare and interpret statistics contained in tables and graphs but also to read and critically evaluate statistically-based arguments involving public policy. Thus, they could form their own political opinion and social conscience without (too much) mass-media and political influence.

In order to achieve this, Istat decided to review its communication and didactic priorities and strategies and to start from young people: they must be considered as one of the key groups towards which new statistical literacy activities should be directed. Our goal is clear: to increase young people's statistical awareness in order to make them more responsible citizens. As Milo Schield says, "Every student should work at mastering grade-appropriate skills in statistical literacy. All college graduates should be statistically literate - not necessarily about the binomial distribution, probability and sampling distributions but about those more-informal arguments that use statistics as evidence."

Therefore, as in the past, Istat is engaged in educational projects for young people and schools. The difference from the past, however, lies in the idea of using the high computer technology and web 2.0 skills which young people nowadays possess in order to attract them to statistics. To break down the wall which separates young people and statistics, the different way of communicating and sharing information of new generations should be taken into account, i.e. their main use of iconic language and parallel reasoning (which allows them to quickly switch from one activity into another).

According to this idea, Istat is planning new projects which focus on the use of web technologies, social networks, mash ups etc.

In order to get better results, Istat is also building new partnerships with public institutions and private companies interested in statistics and in social projects.

#### WHAT WE ARE DOING

The attention to the promotion of statistical culture among young people is now one of Istat strategic priorities and is part of its mission.

In 2010 the team in charge of this strategy carried out an extensive analysis of literature regarding the dissemination of statistical culture, especially in the field of education and school; attention was focused on the web and on its use to bring statistics nearer to young people. This analysis was done at national and international level, as illustrated in the attached bibliography and *webography*.

The new strategy's aim is to find out innovative didactic solutions with schools, which can be standardized, published on the web and used by other schools (teachers and students) and young people in general.

A statistical quiz for lower-secondary school students, planned and developed in 2010, proved to be a very successful experience. The aim of the quiz is to induce students to learn a basic statistical vocabulary. The students involved in this experience first receive a training concerning the topic. A little handbook, with statistical definitions and exemplifying charts, has been realized to help students to learn key statistical concepts.

Once the handbook has been studied, school best students are screened to form two teams, with a *team captain* each. The quiz in itself takes place as a typical television quiz, whose title is *Who wants to be a statistician?* A complex PowerPoint file has been prepared as support for the game. Videos and role-playing games are also used to make the game funnier and more involving and a statistician<sup>6</sup> leads the game.

Students are usually enthusiastic about the quiz and participate in an active way, also because they normally get very competitive.

The first *tournament* of this quiz took place during the 10<sup>th</sup> National Conference of Statistics, which was held in Rome on December 2010.

Four *slots* of the above-mentioned Conference were devoted to young people. Our effort has been to find out innovative forms of participation for students. During these two days, for example, in addition to the described quiz, a *BarCamp* was organized: students were invited to create their own PowerPoint presentations about statistical subjects and then discuss them in a very short time.

New forms of interactive lessons were also experimented: during them, students were asked to work on tables and charts using Excel. All these new methods of teaching were very appreciated by students, above all the statistical quiz, which was the most successful experience. For this reason this quiz has been proposed, since then, several times in many schools of Rome.

After the Conference a new project started, in collaboration with Toscana Istat office, concerning primary schools. The project's design has been carried out with Toscana Istat office researchers, who have prepared didactic materials. New ways of teaching statistics to pupils are experimented in many schools through Italy. Didactic materials are organized in a complex but at the same time simple way. The three files, one for each of the explained concepts (simple tables, pictograms, contingency tables), follow the subsequent standard:

- subject presentation, partially interactive (PowerPoint file);
- exercises on the subject (Excel file);
- technical cards linked to the subject, for teachers (Word file).

At this experimental stage the proposed topics are only three but, with the start of the new school year, new topics will be implemented; they will suit the national indications of the Italian Ministry of Education, University and Research for plans of school studies.

This pilot scheme has involved seven different schools in four Italian regions: three in Toscana, two in Lazio, one in Veneto and one in Campania; in all, 34 classes and 600 students have been involved.

In the first stage of the project, teachers have been asked to use these new didactic materials. After this, the pupils included in the project have been divided in two groups: those who have studied with these multimedia materials and those who have used standard didactic materials. Both groups have been then surveyed, to discover if these innovative materials can be useful to make pupils understand key statistical concepts better, faster and in a more pleasant way.

In the first half of 2011 two instructive internships for students were also planned and carried out, in collaboration with Istat experts.

The first was organized for Wiesbaden Business School (Germany): 40 students were involved. Some Istat researchers explained the basic elements regarding official statistics and the most important Istat surveys (economic and social surveys and censuses). The internship was very appreciated.

The second, very appreciated too, involved more than 20 students from an upper-secondary school of Noto (Sicilia). In this case, since students had more time at their disposal for the internship, a workshop on advanced visualization tools took place after the experts' morning presentations.

Another leading idea of this new Istat strategy is to find and create collaborations with institutional partners and private concerns. As regards the first group (institutional partners) it can be mentioned, for example, the collaboration with the Italian Ministry of Education, University and Research, to realize a planning study about structure and contents of new web pages for dissemination of statistical culture among young people and schools. These web pages, according to our wishes, should become in the future the internet portal dedicated to students and young people who want to approach statistics.

As regards the second group (private concerns), it can be cited a planned partnership with ENI<sup>7</sup>, concerning upper-secondary schools. This partnership aims at disseminating innovative graphic representations of statistical data, such as new types of scatter plots, in which up to five different variables can be represented at the same time (for example, speaking about Italian regions, population, surface, population density, unemployment rate and time).

In the past months some meetings on this topic have been organized: upper-secondary school students and teachers were invited to discuss *if* and *how* such new graphic representations can be useful at school, to renew teaching methods for subjects as, for example, geography, history or economy.

In 2010-2011 Istat and the Italian Statistical Society (SIS) sponsored the ISLP Poster Competition<sup>8</sup>. In May the Italian Committee<sup>9</sup> selected two winning posters, one for each age category, that afterwards took part to the International competition phase: for the category *students born in 1995 and younger*, a poster on the possible combination of pollution free environment and economical development has been selected; for the category *students born in 1992 and younger*, the chosen poster is on comparison and availability of Italian energies (renewable and non-renewable ones). According to the Committee's assessment, the selected posters have an interesting content, they use statistical sources and data in an appropriate way and they show brilliant conclusions. Moreover, they are graphically pleasant.

## WHAT WE ARE GOING TO DO

Many ideas are still to be realized.

One leading idea was to create a videogame which would have helped lower-secondary school students to choose the "right" upper-secondary school and then the "right" university faculty (or job) and would have guided them to find their place in the labour market. This idea has been set aside, due to many reasons: the main one was the difficulty to find adequate economic resources from sponsors. As a matter of fact to create a good and catching videogame for shrewd young people it would have been necessary a sum of at least 500.000 € that was impossible to collect.

However, the team project continues to think to a web guide about orientation for school and University students: they would find information about orientation in the foreseen website pages, conceived to be very friendly and communicative.

Another proposal, that the team will try to realize, is to induce pupils aged 6-14 draw data in their own, creative way and put one or more photos of these drawings on Flickr website; pupils would be guided in the world of statistics, with the aim to make it more familiar and connected to their everyday life (“how many boys and girls are in my class?”, “how tall are they?” etc.).

Another possibility is to reinvent data in an artistic and creative way (through various techniques like collage, painting etc.). Afterwards they could take photos of their works and put them on Flickr website.

The third proposal is to invite students aged 10-19 to write a story/article or to realize a video, a blog, a website. Various subjects could be proposed:

- “I’ve used statistics to...”
- “My class has used statistics to...”
- “My teacher has used statistics to...”
- “In my city (municipality, district, region, country) statistics has been used to...”

Students would be invited to critically read numbers and to rebuild their meaning using comparisons, verifying sources and documenting their research work.

The last idea is to make students from all types of school narrate their suburb, their region, their city. Under their teachers and Istat experts’ guidance, they would realize drawings, an article, a series of images, a video, a blog or a website to describe the territory in which they live. In this way they would understand that data and statistical information can be very useful to analyze and study their territory from close up.

## CONCLUSION

Istat is trying to make statistical information more and more accessible and comprehensible to all people and not only to young people. As a slogan of our president Enrico Giovannini says: *we must turn statisticians from information producers into knowledge generators.*

The implementation of web 2.0 tools to rethink Istat website and to bring it nearer to users, also not specialist ones, wants to make statistics more and more a *public good*, as it always should be.

Cartography and dynamic charts, the use of collaborative systems, innovative approaches rethink therefore the official statistics profile, that more and more opens from the narrow world of National Statistical System operators and experts to establish a new agreement between official statistics and society.

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<sup>1</sup> The views expressed in this paper are those of the authors and do not necessarily reflect the opinion of Istat.

<sup>2</sup> The Project *Dissemination of statistical literacy among young people* was formally constituted on January 2011. The team is composed of Marina Peci (coordinator), Barbara Ascari, Francesco Michele Mortati.

<sup>3</sup> Interview published on the Italian weekly magazine «L’Espresso» on the 16<sup>th</sup> of October 2009.

<sup>4</sup> [http://www.istat.it/salastampa/comunicati/in\\_calendario/nuovetec/20101223\\_00/](http://www.istat.it/salastampa/comunicati/in_calendario/nuovetec/20101223_00/)

<sup>5</sup> Milo Schield, “Viewpoint on Education”, <http://www.augsburg.edu/ppages/~Schield/>, May 2010.

<sup>6</sup> Fortunately, this colleague is an amateur comic actor too and this makes the game more interesting and amusing.

<sup>7</sup> An Italian multinational oil and gas company.

<sup>8</sup> <http://www.stat.auckland.ac.nz/~iase/islp/competition-second>

<sup>9</sup> Maria Gabriella Ottaviani (Sis – Country coordinator), Stefania Mignani (Sis), Laura Terzera (Sis), Marina Peci (Istat), Sofia Barletta (Istat), Francesco Michele Mortati (Istat), Barbara Ascari (Istat – Committee secretariat).

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<http://www.progenealogists.com/sarahjessicaparker.htm>  
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<http://www.statcan.gc.ca/dli-ild/dli-idd-eng.htm>  
<http://www.statlit.org/>  
<http://www.statlitblog.org/>  
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[www.scienceinsociety.eu](http://www.scienceinsociety.eu)  
[www.teachertube.com](http://www.teachertube.com)  
<http://www.un.org/>  
<http://www.useit.com/alertbox/blog-front-pages.html>

### Analysed sites

Country	Body	Webpages for numeracy/statistical literacy
<b>Australia</b>	Australian Bureau of Statistics	<a href="http://www.abs.gov.au/websitedbs/cashome.nsf/Home/Entry%20Page.es">http://www.abs.gov.au/websitedbs/cashome.nsf/Home/Entry%20Page.es</a>
<b>Canada</b>	Statistics Canada	<a href="http://www.statcan.gc.ca/edu/index-eng.htm">http://www.statcan.gc.ca/edu/index-eng.htm</a>
<b>Denmark</b>	Statistics Denmark	<a href="http://www.dst.dk/homeuk.aspx">http://www.dst.dk/homeuk.aspx</a>
<b>Finland</b>	Statistics Finland	<a href="http://tilastokeskus.fi/tup/oppilaitokset/index_en.html">http://tilastokeskus.fi/tup/oppilaitokset/index_en.html</a>
<b>France</b>	Insee Ined	<a href="http://www.statapprendre.education.fr/insee/">http://www.statapprendre.education.fr/insee/</a> <a href="http://www.ined.fr/fr/tout_savoir_population/">http://www.ined.fr/fr/tout_savoir_population/</a>
<b>Germany</b>	Statistisches Bundesamt	<a href="http://www.destatis.de/jetspeed/portal/cms/">http://www.destatis.de/jetspeed/portal/cms/</a>
<b>Ireland</b>	Cso	<a href="http://www.cso.ie/studentcorner/">http://www.cso.ie/studentcorner/</a>
<b>Norway</b>	Statistisk sentralbyrå	<a href="http://www.ssb.no/">http://www.ssb.no/</a>
<b>New Zealand</b>	stats.govt.nz	<a href="http://www.stats.govt.nz/methods_and_services/schools_corner.aspx">http://www.stats.govt.nz/methods_and_services/schools_corner.aspx</a>
<b>The Netherlands</b>	Cbs	<a href="http://www.cbs.nl/nl-NL/menu/home/default.htm">http://www.cbs.nl/nl-NL/menu/home/default.htm</a>
<b>Portugal</b>	Ine/Alea project	<a href="http://www.alea.pt/english/">http://www.alea.pt/english/</a>
<b>United Kingdom</b>	Ons	<a href="http://www.stats4schools.gov.uk/">http://www.stats4schools.gov.uk/</a>
<b>Spain</b>	Ine	<a href="http://www.ine.es/en/welcome_en.htm">http://www.ine.es/en/welcome_en.htm</a>
<b>United States</b>	U. S. Census Bureau	<a href="http://www.census.gov/">http://www.census.gov/</a>
<b>Sweden</b>	Statistics Sweden	<a href="http://www.scb.se/default_2154.aspx">http://www.scb.se/default_2154.aspx</a>

U.S. website [Census Bureau](http://www.census.gov/), United Nations website (<http://www.un.org/Pubs/CyberSchoolBus/>) and the webpage <http://www.stopdisastersgame.org/en/playgame.html>, published under the aegis of United Nations, have been analysed too.

U. S. [Ministry of Education](http://www.ed.gov/) website was also analysed, as [CensusAtSchool](http://www.census.gov/) Project website, a project started in 2000 in United Kingdom and that was afterwards joined by many other countries.