ISTAT'S NEW TOOLS IN TEACHING STATISTICS TO DIGITAL NATIVES[i]

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Istat (Italian National Institute of Statistics) has been actively engaging in strongly disseminating statistical literacy towards civil society and, to this aim, established in 2011 the Advanced School for Statistics and Socio-economic Analyses. According to this mission, one of the main targets is represented by the world of education, students and teachers. The use of the Web is vital in order to catch the attention of digital natives and to attract them to statistics. Istat's current strategy is to find out innovative didactic solutions for the different school levels, through learning and collaborative environments and emerging technologies in teaching statistics. According to this idea, Istat has created an interactive virtual laboratory – ScuoladistatisticaLab (SchoolofStatisticsLab) for the secondary school. For the lower school levels, Istat has realized other didactic tools developed in collaboration with Italian institutions and Istat's regional offices.

THE ROLE OF ISTAT IN STATISTICAL LITERACY

In Italy, the National Institute of Statistics (Istat) has always been actively engaged in widespreading statistical literacy in civil society. At present the main difference lies in the strategic importance given by Istat to the promotion of statistical literacy. Therefore, Istat has included statistical literacy as a key point of its mission. In order to accomplish this task in the best way, it has decided to set up the *Advanced School for Statistics and Socio-economic Analyses* (Saes). The Advanced School has been established by Presidential Decree n. 166/2010 and represents an important innovation in Italy.

One of the Advanced School's main goals is exactly to increase statistical literacy among people and, in particular, the world of education, both students and teachers. Istat strongly believe that young people are a strategic investment for the future society.

Schools represent the best way to get in contact with young people. The current Istat's strategy is to devise innovative didactic solutions with the help of schools; these new ideas could become best practices, which can be standardized, published on the Web and used by other schools (teachers and students), but by the broad public too. Istat works together with teachers in order to both get a sense of the problems emerging in teaching statistics in class and to find out strategies to implement learning and collaborative environments.

To reach these goals, the use of the Web is essential in order to draw the attention of *digital natives*: using the high computer technology and the Web2.0 skills which young people nowadays possess it is possible to attract them towards statistics in a more efficient way.

ISTAT'S NEW DIDACTIC PRODUCTS

According to the above-mentioned idea that schools are one of the main targets in the promotion of statistical literacy, Istat has recently reorganized and updated the webpages specifically dedicated to young people on its site, a section called *Under21*. Here teachers and students may find interesting and useful products, also created in partnership with Italian institutions and Istat's regional offices: didactic materials, best practices, information, contests and a rich repository, containing didactic experiences realized in partnership with schools from the year 2000.

This section also contains the latest innovative didactic products, realized according to the different school levels:

- for pupils aged 6-10, new and interactive ways of teaching statistics (e.g. dynamic slides to explain simple statistical concepts) in partnership with Istat's regional offices
- for students aged 11-13, a kit for teachers based on 'learning-by-doing'. The project has been carried out in partnership with the Giovanni Agnelli Foundation in Turin (a cultural foundation, deeply involved in projects for young people).
- for students aged 14-18, a virtual didactic laboratory (*SchoolofStatistics-Lab*).

In K. Makar, B. de Sousa, & R. Gould (Eds.), *Sustainability in statistics education. Proceedings of the Ninth International Conference on Teaching Statistics (ICOTS9, July, 2014), Flagstaff, Arizona, USA.* Voorburg, The Netherlands: International Statistical Institute. iase-web.org

Didactic Kits

The learning tools for pupils are available for free download in the above-mentioned section Under21. These tools are interactive and designed to be adaptable to the needs of teachers: laboratory, self-training or group/class activities. They pursue the aim of arousing curiosity and creativity of children and to make them understand key statistical concepts in a faster and more pleasant way.

Some of the explained subjects comprehend technical arguments, such as simple tables, pictograms, mean, mode, bar diagrams, probability, but also Istat itself and the role of statisticians.

A kit is generally composed by:

- subject presentation, partially interactive (PowerPoint file); the statistical concept is described in a funny and simple way, with many drawings and through the presentation of situations familiar to children;
- exercises on the subject (Excel file);
- technical sheet linked to the subject, for teachers (Adobe file).

This way of teaching statistics to pupils has been experimented in many schools through Italy. Teachers have been asked to use these didactic materials in class. After that, pupils of the same school have been divided in two groups (those who have studied using these multimedia materials and those who followed traditional lessons) and they have been surveyed. The groups who learned with the new materials reached generally a higher score.

Let's Do Statistics!

Created for students of the intermediate level, the Kit "Facciamo statistica!" (*Let's do statistics!*) is composed by a series of tools to ease teaching/learning of statistics for students aged 11-13. The Kit is available for free access and download from the section Under21 or directly from the website of the Giovanni Agnelli Foundation.

Three questionnaires are available that are specifically created for this project. Through these questionnaires students can carry out surveys in class on three different themes: environment; gender stereotypes; spare time and eating habits. Surveys are different not only in the content but also in the increasing difficulty levels. The three surveys could be carried out both in a traditional way, by paper, and on line. In the first way, after the questionnaires have been collected, data entry should follow. In the second way, on line surveys are carried out through the free software *Lime Survey*. In both ways, however, teachers are helped in the creation of tables and graphs by semi-automatic software packages. These kinds of software give back information on Excel spreadsheets. The Kit is completed by hypertext guidelines, a methodological manual to give theoretical support to surveys, and a manual for the on line surveys.

Schoolofstatistic-Lab

The product "Scuoladistatistica-Lab" (*Schoolofstatistics-Lab*) has been developed for students aged 14-18, but also university students find it useful. We really hope that it will become an innovative tool to develop statistical skills first of all among students, but in the future in civil society, too. The lab is available for free access from the section Under21.

The lab is also open to teachers and students' contributions through an on line platform and with the help of an interactive and dynamic visualization tool (*Statistics eXplorer*). This platform is a laboratory/workroom for statistical knowledge. It is planned with different growing difficulty levels and it has two different kinds of login, both for students and teachers. As users (in both cases) subscribe to Schoolofstatistics-Lab, they enter the first two levels: "Formazione" (*Training*) and "Laboratorio" (*Workroom*).

In the Training Area (Fig. 1), many didactic materials on basic statistics are available for users. The Area is divided into four parts, that include: manuals, training modules, glossary and methodological definitions, some very useful links for in-depth analysis, tests for evaluation/self-evaluation.

The Workroom Area (Fig. 2) is also divided into four parts, which are scaled according to difficulty. At the lowest level, users can watch some tutorials on how to read statistical tables and

graphs and other simple research materials. Difficulty increases in the next levels: for example, users are asked to collect statistical data into time series, also giving comments on them and creating the most appropriate chart. At the final level users can autonomously work in creating statistical indicators. They can analyze the statistical indicators uploaded to the platform or can create new indicators, with the help of the Web application Statistics eXplorer (Fig. 3). This tool is based on storytelling and dynamic visualization tools. Users with different backgrounds and expertise take part to the creative discovery process, that changes statistical data into knowledge. This knowledge exchange process develops a shared understanding with the other users and, as agreement has been reached, the story can be published in the public domain. A specific mechanism (snapshot) helps the author of a story to highlight data views of particular interest and as a result to guide others users to important visual discoveries relating to statistical information. The approach based on cooperative learning among users (teachers and/or students or simple users) is a very important didactic feature of the platform.

The platform is composed by other two main Areas, specifically reserved to teachers. They can find here not only other more complex and detailed didactic materials, but also the possibility of organizing a virtual class with their students and tools to produce their own didactic materials.

Finally, a section of the platform hosts some interesting educational videos on economic and statistical concepts (as spread, GDP, probability etc.) realized by the students themselves performing as actors, that make these videos catching and funny for their peers.

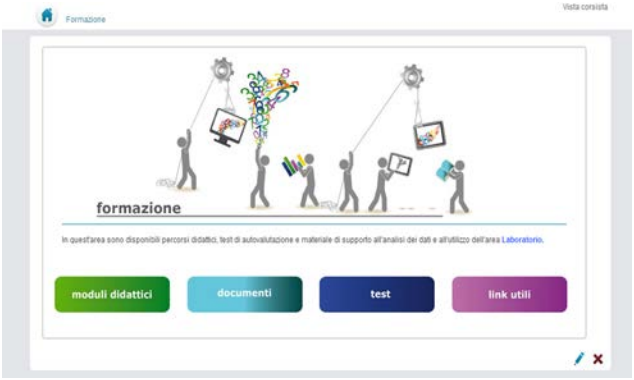

Fig. 1: the Training Area access page

Fig. 2: the Workroom Area access page

Fig. 3: A storytelling using Statistics eXplorer

CONCLUSION

Istat is trying to make statistical information more and more accessible and comprehensible to people in general, but to young people in particular. The implementation of Web2.0 tools, cartography and dynamic charts, the use of collaborative systems, innovative approaches to statistics teaching try to catch the interest of students towards statistics in a more useful - and in the meantime - amusing way.

The creation of tools and models put on line, as open access and on institutional sites, constitute guaranteed best practises that can be shared by an increasingly wider range of Italian schools. But as in bidirectional flow, schools (teachers and students) using these systems can help us in improving them, and also in giving us other ideas to bring statistics even nearer to users, to make it really a *commons*, as it always should be.

[i] The views expressed in this paper are those of the authors and do not necessarily reflect the opinion of Istat (Italian National Institute of Statistics).

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WEBOGRAPHY

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Didactic kits: http://www.istat.it/it/istituto-nazionale-di-statistica/attivit%C3%A0/scuola-superiore-di-statistica/under-21/pacchetti-didattici

Let's do statistics!: http://www.fga.it/news/tutte-le-news/dettaglio/article/facciamo-statistica-432.html#.Utb5L2Fd7Mx

Lime Survey: http://www.limesurvey.org/en/

Schoolofstatistics-Lab: http://scuoladistatistica-lab.istat.it/index.php

Under21: http://www.istat.it/en/about-istat/activities/advanced-school-for-statistics/under-21