

BEYOND THE DATA: EXPLOITING THE IT TOOLS YOUNG AND ADULT PEOPLE USE IN THEIR EVERYDAY LIFE

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Teaching statistics requires initiatives different from those carried out in the past. The web 2.0 (participation, interactivity, reputation systems) affects the way in which students approach knowledge and education; at the same time, the web provides tools that can be adopted in teaching statistics. Students use the net for blogs, Facebook, videogames and in a limited way for educational purposes (consulting, copying, pasting). Nonetheless they could exploit it for collective work, as happens in experiences like Clickworkers, the NASA experiment that used public volunteers; or SETI@home, an experiment that uses Internet-connected computers in the Search for Extraterrestrial Intelligence, or the use of mashup (application that combines data or functionality from more sources) applied to collective projects in statistics. The reputation systems, for example, can be compared to the role played by statistical metadata in building trust in statistical data. This paper illustrates the possibility of adopting the web 2.0 tools in teaching statistics.

INTRODUCTION

The initiatives required for improving statistical literacy should be very different from those carried out in the past. The reason of this statement is obvious and does not deserve to be repeated in the light of the changes occurred in recent years – we read about the changes introduced by the new technology everyday, everywhere. See for example, the widespread diffusion of Blogs (since 1997), Facebook (since 2004), Twitter (since 2006), Flickr (since 2002), or think of two key words such as *mashups* or *crowdsourcing* and we have a clear picture of the era we are living in: social networks and the web 2.0 have reshaped every field of our life in a very pervasive way.

This widespread presence has produced some peculiar consequences:

- The way we use the technology has reduced the difference between behaviours and habits in personal life and in the educational field. This equated the patterns for approaching different situations, affecting young people and adults and, in particular, students. The approach to leisure, entertainment, communication, knowledge and education is the same, with no difference in the use of technology for studying or playing. Students move from an environment to another without discontinuity.
- These tools enable students – as along with everybody else – to choose, to build, to produce, to share the contents by themselves, promoting and improving interactivity and direct participation.

These two consequences characterize the context in which our reflection is carried out and should be taken into account when advancing new proposals and finding new effective solutions.

In order to identify the proper initiatives we should move from an approach through which teachers suggest, propose, advice, even co-operate with the students to an approach—difficult indeed—through which teachers listen to their students and invite them to plan, to create, to invent their own tools for learning and studying statistics and for understanding statistical information. The result of this relationship could be an environment where the key words are collaboration, interaction, sharing knowledge, skills and abilities, beyond the predefined roles “teacher/learner”. In this perspective—we are afraid—the role of teachers will be reduced, and limited to the co-operation described above.

This kind of approach does not mean that the innovative materials introduced in teaching, in recent years, must be avoided; we suggest that initiatives should be accompanied by the awareness that they are not exhaustive, because it is necessary to transport the same patterns adopted in everyday life into the school.

THE CONTEXT

In order to support this compelling approach we will base our proposals not only on the frame described above, but also:

- i) on the results of experiences carried with the students for improving their statistical literacy;
- ii) on the conclusions reached by studies and researches carried out in different fields;
- iii) on the data from surveys that tell interesting stories on the behaviours, habits and opinions of the users of new technology;
- iv) on what is happening in the world of dissemination and the communication of statistical information, both in the statistical offices and in the media.

All these items imply the following considerations:

- i) The results of the experience we carried out with students for improving statistical literacy taught us that the best results are reached when the students plan, design and make a product (a cd-rom called “Sigma” in 2003) by themselves. They used the tools available at the time, without all the opportunities available now, but the approach was the same mentioned above: autonomy and collaboration. Another interesting experience refers to surveys – small and limited indeed – which nevertheless students and their teachers consider of great usefulness, because they can carry out a statistical project through its whole cycle. A similar research was carried out by interviewing a little group of selected respondents: it is easy to see how this could profit of the use of YouTube, also in the light of SciVee, the YouTube for science.
- ii) On the basis of conclusions reached by some biologists and neuro-scientists who are studying the effects of the use of new technologies – young people are immersed in it since their childhood (Wolf, 2008) – we can say that the way the technology affects the brain, perception and language presents interesting issues: the first outcomes seem to deny the negative stereotype; on the contrary, the flexibility and adaptability of our brain allow to develop new abilities, namely an attitude to thinking and reasoning through images so widespread in the digital world. This issue is interesting for its implications with the extensive use of interactive graphics in newspapers and on the web in general.
- iii) On the data from surveys carried out by Pew Internet & American Life Project (one of seven projects carried out by the Pew Research Center, a nonpartisan, nonprofit “fact tank” that provides information on the issues, attitudes and trends shaping America and the world). The Project produces reports exploring the impact of the Internet on families, communities, work and home, daily life, education, health care, and civic and political life. So, Pew tells interesting stories about the behaviours, the habits and the opinions of the users of new technology, namely about writing on the Web, as we will illustrate in the following pages (Lenhart, Arafeh, Smith, Macgill, 2008).
- iv) For our theme what is happening in the world of the dissemination and communication of statistical information is crucial: UK National Statistics – but other National Institutes, including ours, are going the same way – reduced the size of its paper publication portfolio by around 90 per cent over the last 12 years, with an increasing number of “web only” releases (Smith, 2009). eBooks and e-paper are finally breaking out from the geek niche and getting growing mass market shares. This implies that in the near future students must develop a good ability to learn from digital tools and materials.

SOME PROPOSALS

Moving from the considerations carried out above, we can now outline some proposals.

Facebook, jointly with the possibilities offered by wikis (see *Statistics Explained*, the new space in the Eurostat web site), provides an environment within which it is possible to learn, building tools and materials in a co-operative way. This is already happening in some universities, where the students are connected through Facebook. Students can create their college social network, where to collect, compare, share, and discuss data and metadata. In particular, this

environment can benefit from a very interesting aspect concerning “writing”. This ability, considered “obsolete” in the common understanding because of the use of the technology, is obviously used in blogs, in Facebook, in e-mailing. What is odd is that young people, interviewed by the Pew survey (Lenhart, Arafeh, Smith & Macgill, 2008), think that the ability they have in the social networks is not “writing”. This interesting quirk provides a good opportunity to exploit this “opinion” in order to improve writing abilities and to use them in statistics learning. What we mean is that to write about the whole cycle of a survey, from design to communication of the results, in particular, is a strong and effective tool for learning and understanding statistics and statistical information. We have a lot of choices for this activity: students may write in a blog for statistics, in a wiki for metadata, in Facebook for sharing knowledge and so on. Writing, from this point of view, is a means to reason, understand and learn, adopting the same environment and tools the students use in everyday life. We can say that is a kind of Trojan horse, a trick for re-introducing an ability we thought was dead and for re-using it in a new technological context. It’s an interesting paradox, a kind of revenge of a traditional ability against technology. Culture, knowledge, progress cannot be classified and rigidly tagged: our brain and our intelligence work with a multiplicity of abilities, both old and new.

According to Amanda Lenhart: “Teens write a lot, but they do not think of their emails, instant and text messages as writing. Yet despite the nearly ubiquitous use of these tools by teens, they see an important distinction between the “writing” they do for school and outside of school for personal reasons, and the “communication” they enjoy via instant messaging, phone text messaging, email and social networking sites.”

The importance we give to this activity is strictly connected to the crucial role we assign to statistical metadata in order to understand statistics (see our paper, where metadata are compared to a scaffolding, Barbieri & Giacché, 2006).

Our second proposal is based on the supremacy images have gained in communicating statistical information. You can see, daily, the wonderful interactive graphs released by the website *Flowing data* about every aspects of our life, not only about economics and statistics. Every issue of our life can be represented by a graphic – the way you slept is betrayed by the shape your hair presents in the morning. We know (Wolf, 2008) that our brain is dramatically affected by images, interactive graphics, visual explorations (one can immediately refer this to the representation of the statistical concepts). The familiarity of students with this world cannot but help learning. So, this field, too, is good for experimenting the use of graphs through available software, and to build autonomously information and learning tools. The pages of newspapers—*The Economist*, *The Guardian*, *The New York Times*—devote a lot of space to images and graphs, especially interactive graphics in their online editions. The combination of images, numbers, words and stories is a strong instrument for understanding statistics and statistical information. Luisa Carrada, in her book *Il mestiere di scrivere. Le parole al lavoro tra carta e web*, (*The craft of writing. Words at work between paper and the Web*) describes very effectively the shift, mainly in newspapers when they report statistical data, from a *portrait* pattern to a *landscape* pattern. This way to represent information is increasingly becoming a ground for experimenting links between words, numbers and images. Also the shapes of letters and numbers (typography) are important in an environment where “the images help the words and the words become images” (Carrada, 2008). This issue is particularly crucial if we consider the communication and dissemination policies of National institutes of statistics, moving towards a perspective where the reduction of paper publications is already a reality and where probably in the near future all data will be available on line (Smith, 2009).

Videogames. In order to convert to the approaches mentioned above, we need to be brave. We dare to accept the challenge, also because proposing today the use of the same tools as yesterday sounds like when you keep using a fax when everyone else uses e-mail. Generally speaking, early adopters strongly dislike to be obliged to use the old tools when they already use the new ones. Students are not different in this. We know that one needs courage to propose the creation of videogames for learning statistics and statistical information. But we are not alone in this kind of transgression, in this attack against the holiness of teaching. In 2007 Oecd organized a meeting where many papers discussed in depth the features and the use of videogames in education (Oecd-Ceri Expert Meeting on Videogames and Education, 2007). On the website of the United

Nations you can see—and play—a videogame for knowing and understanding disasters (www.stopdisastersgame.org). The aim of the game is to teach prevention. So, together with the amusement and all the features that make play so attractive (Johnson, 2005) you find out that at the bottom of the screen each of your choices, each decision you make is based on statistical data. The decisional process confronts the same issues in every field of application: to choose among different options, to select among a huge amount of data, to decide what information is reliable, useful for your needs (relevant) and, quite often, to make quick decisions in a condition of uncertainty. This process is at the core of every activity, the entire process of statistical reasoning and thinking follows these rules, respects this pattern. Do we need statistical data to support the proposal of using videogames as a teaching tool? From a Pew survey we know that “Almost all teens play games. Video gaming is pervasive in the lives of American teens—young teens and older teens, girls and boys, and teens from across the socioeconomic spectrum. Opportunities for gaming are everywhere, and teens are playing video games frequently. When asked, half of all teens reported playing a video game “yesterday. Those who play daily typically play for an hour or more. Fully 97 per cent of teens ages 12-17 play computer, web, portable, or console games. Additionally: 50 per cent of teens played games “yesterday.”(Lenhart, Kahne, Middaugh, Macgill, Evans & Vitak, 2008).

This is not the place to go in depth about the different kinds of videogames, but it is useful to say that there are puzzle games (such as Tetris), role-playing games (simulations where the player has to succeed within some simplified recreation of a place or situation), strategy games: students can choose that the type that fits their needs. There is also another important categorization to be recalled: we have individual and multiplayer games; the second ones present the advantage, particularly Massively Multiplayer Online Role Playing Games (MMORPGs) that players must cooperate. This aspect, together with the spirit of challenge and fighting, attracts interest and motivate youngsters—and adults too—in playing games. We want also to emphasize that videogames benefit from *mashups*; it is possible (and many people are able to do it) to modify the rules of games, making them easier or more challenging for the players. This represents a strong opportunity for shaping games aimed at studying statistics.

At last, we would like to propose a reflection and a possible translation of some experiences carried out adopting *mashups* and *crowdsourcing*.

Jerry Brito (Brito, 2007) describes how it is possible to create a service, adding value, putting together data from different sources using Google maps. *Mashups*: we can read in Wikipedia “is a web page or application that combines data or functionality from two or more external sources to create a new service. The term *mashup* implies easy, fast integration, frequently using open API data sources to produce results that were not the original reason for producing the raw source data. An example of a *mashup* is the use of cartographic data to add location information to real estate data, thereby creating a new and distinct web API that was not originally provided by either source”. This is a ground where creativity can be magnified and empowered; starting from the use of *mashups* in music and with videos, every kind of information can be mixed with other sources for practice and exercise in statistics.

Crowdsourcing. In the book *Crowdsourcing* (Howe, 2009), the author tells the story of two boys who created a successful t-shirt company by launching a competition for the best design on their site. The will to participate in the race, to win the competition, to measure oneself up and the pride in making something gorgeous: all these aspects are relevant and cannot be forgotten when talking about education (Ignatius of Loyola knew that 500 years ago). It is worth noting that the very cover of Howe’s book is the result of *crowdsourcing*: the author invited people to send him proposals for the cover. A lot of other experiences, in the field of politics or law, are described by Jerry Brito (2007). The idea of a lawyer who asked the readers of his blog to collaborate in reading and analyzing of a huge amount of documents—during the night—and the readers’ ready participation confirm that we have a powerful tool to collect documents and research, when the amount of the material is huge and the result cannot be achieved by a single individual or by a small group. Statistics, namely microdata (of course once respecting confidentiality issues) can be analyzed by a great number of students and then shared, compared, discussed, put together. Let us used public volunteers for scientific tasks, or *SETI@home*, a scientific experiment that uses Internet-connected computers in the Search for Extraterrestrial Intelligence: these experiences have

anticipated the opportunities offered by technology, interpreting *ante litteram* the spirit of interaction, collaboration, web 2.0 concepts, social networks. Why do not apply these patterns to the educational environment?

CONCLUSION

We have illustrated combinations, paradigm shifts, short circuits among some aspects of our era: videogames, born for entertainment but effective for studying and researching; skills, like “writing”, considered obsolete but becoming edge tools, to be paradoxically re-evaluated; and social networks apt to play the role of “containers” easily filled by different kinds of contents, chosen by students and teachers together. This is an opportunity not to be missed.

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