

## ANOTHER BRICK IN THE WALL – IMPROVING STATISTICAL LITERACY IN IRELAND

MacFEELY, Steve<sup>1,2</sup> & McCUIRC, Eoin<sup>2</sup>

<sup>1</sup>Centre for Policy Studies, University College Cork, Ireland

<sup>2</sup>Central Statistics Office, Ireland

Contact email: steve.macfeely@cso.ie

### ABSTRACT

*In May, 2007 the Irish Central Statistics Office embarked on an Education Outreach Programme. The programme is driven by the desire to increase the awareness and effective use of statistics in Ireland. Educating CSO data customers is seen as a key driver in this goal. Since 2007, the CSO has fostered key partnerships at a national and international level to develop and implement a number of key projects. Seminar Series, Statistical Liaison groups, Oireachtas briefings, CensusAtSchool, the John Hooper Medal For Statistics, the Professional Diploma in Official Statistics for Policy Evaluation, the International Statistical Literacy Poster Competition and YouTube video production, are some of the projects developed under the umbrella of the Education Outreach Programme. This paper outlines the rationale behind the development and implementation of the Irish Education Outreach Programme with illustrations drawn from the Irish experience to date.*

**KEYWORDS:** *statistical literacy, outreach, collaboration*

*“We don't need no education  
We don't need no thought control”*

Pink Floyd - Another brick in the wall - Part II

### INTRODUCTION

No doubt when Roger Waters wrote that immortal couplet, he was well aware that nothing could be further from the truth. Most would argue that education is the key to intellectual freedom and discernment, which in turn are the skills necessary if we are to protect against thought control. Perhaps this is an example of the ‘*dark sarcasm*’ Waters refers to in the subsequent lines of the song?

In 2007, when the Central Statistics Office (CSO) in Ireland launched the outreach programme ‘*Investing in the Future*’ [1] it was recognised that the office could not address all of the educational gaps throughout the school, tertiary and working populations. It was also recognised that, CSO staff did not necessarily have the necessary skill sets to design and implement a successful outreach programme. Hence CSO would need to identify and collaborate with professionals in the education space. In short, CSO recognised that we could not ‘*leave them kids alone*’ but equally we could only contribute part of the solution; CSO could only supply a few bricks for the wall!

This paper will look at the steps taken by the CSO since the 2007 decision to improve statistical literacy in Irish society through an Education Outreach Programme. The paper provides a brief summary of how this programme began and then outlines how it has evolved. Initiatives in three broad target areas are highlighted:

1. Primary and Post primary Education (as initially mooted in the programme);
2. Third level and continued professional development; and
3. Media and wider society.

### *IN THE BEGINNING...*

In 2007, the Senior Management Committee of CSO found itself deliberating the role of the office with regard national statistical literacy. One of the five High Level Goals [2] suggested that statistical education was not only a good idea but furthermore, CSO should play an active role in progressing that education.

A proposal put to the SMC argued that CSO should develop an Education Outreach Programme:

*Developing an Educational Outreach Programme is underpinned by the CSO mission statement. This statement commits the Office to meeting the information requirements of all its customers in a changing economic and social environment. The CSO has a core value of 'excellent service to customers' and two of its high level goals are 'increased awareness and effective use of statistics' and 'progressing the development of the Irish statistical system'. The proposed Educational Outreach Programme is a fundamental building block to the Office achieving this mission.*

The proposal further argued that the aim and modus operandi of the programme should be: *To create an educational resource in collaboration with the Dept. of Education and other relevant national and international organisations in order to improve statistical literacy.*

The concept of statistical literacy presented in the proposal leaned heavily on Smith's [3] definition, which included how to:

- *Understand and interpret statistical data;*
- *critically evaluate statistical information and data-related arguments;*
- *use the information in context of daily life; and*
- *discuss or communicate one's reactions*

The proposal also argued that the programme should be designed to maximise and promote the statistical outputs of the office. This would be done by:

*Creating real life projects that enhance the learning process and nurture the life skills needed in our knowledge based society, while supporting the Irish education system in developing its youth as future policy makers, entrepreneurs and statisticians.*

The SMC endorsed the proposal to establish an Education Outreach Programme, viewing it as a long term investment. The rest, as they say, is history...

### *PRIMARY AND POST PRIMARY EDUCATION*

The CSO Education Outreach Programme initially focused on reaching out to the student population. In Ireland, Primary School students are aged 12 and under and Post Primary School students are typically aged 18 and under [4]. This section of the paper will outline a number of separate initiatives that have been designed for primary and post primary education:

1. CensusAtSchool;
2. John Hooper Medal;
3. The Census Story; and
4. An Post Rás project.

The CSO had a very limited budget that could be dedicated to the Education Outreach Programme. Furthermore, CSO had no particular teaching skills or knowledge of the education space. Thus, it was recognised that targeted projects and collaboration would be essential if the programme was to have any impact. A review of activities in national statistical organisations and educational institutes both in Ireland and abroad identified some promising designs and ultimately led to the creation of a number of key partnerships.

### *CENSUSATSCHOOL*

The UK Royal Statistical Society Centre for Statistical Education (RSSCSE) was one such partner as they are mandated to '*promote the improvement of statistical education, training and understanding at all ages*'. Liaising with the RSSCSE was a very positive step, and with their active support, led to the development of the Irish CensusAtSchool website [5].

Getting buy-in for CensusAtSchool from Irish Schools was another matter. Initially, this proved a real stumbling block. However, as luck would have it, synchronicity played a part. The Irish National Council for Curriculum Assessment (NCCA) had, at the time, reviewed the post primary school curricula. Furthermore 'Project Maths' had recently been established and tasked with the mission of providing support to Irish mathematics teachers who would soon be teaching the new mathematics curriculum which now emphasised statistics and probability. Both the NCCA and Projects Maths were very interested in developing and using CensusAtSchool. The National Centre for Technology in Education (NCTE) were also very interested in CensusAtSchool as it fit neatly with their remit to '*Promote and support the integration of ICT in learning and teaching in first and second level schools*'. The NCTE through HEAnet (Ireland's National Education and Research Network) offered to host CensusAtSchool and manage the teacher interface with CensusAtSchool. All these links were formally agreed in a Memorandum of Understanding between CSO, the NCCA and the NCTE.

The CensusAtSchool website went live in the 2008/2009 academic year and was used by Project Maths as part of a pilot trialling the new mathematics curriculum in selected schools.

Each year a new CensusAtSchool questionnaire is created and at the end of the year statisticians in the CSO analyse the results and produce tables, graphs, analyses and commentary designed to complement the presentation and analysis tools taught in the new mathematics curriculum. Since the 2010/2011 academic year, CSO has published a special edition release that analyses the latest CensusAtSchool data and publishes the results in a student friendly format [6] [7]. CensusAtSchool is a resource, open to both Primary and Post Primary schools. Teachers from all schools are welcomed and encouraged to participate in completing the latest questionnaire and to download and experiment with the data. Each year Irish data are loaded to an International Random Data Selector containing the latest survey data responses [8], enabling teachers to extract cross-national and international data for comparative purposes. Today, there are a range of resources available on the CensusAtSchool website for a selection of Primary and Post Primary subjects. These resources are periodically updated with the most recent data available.

### *JOHN HOOPER MEDAL*

On World Statistics Day, October 10, 2010 the CSO launched the annual John Hooper Medal for Statistics [9]; a national poster competition for post primary students. A beautiful hand crafted, engraved, silver medal is awarded to each student on the winning team (see Appendix 1) along with individual student and school cash prizes for the top three winning posters. This poster competition is run each year and is combined with the International Statistical Literacy Project (ISLP) Poster Competition, in the years where the ISLP run a competition. The poster competition reaches out to post primary school students, encouraging them to explore an issue and present their findings in a poster format, working as a team and using their mathematics and statistics skills. In the most recent competition (2013) 1,281 students registered for the competition from schools across the island of Ireland. 651 students actually submitted a total of 253 posters by the closing date.

Judging is 'blind' and takes place over a number of weeks in three phases. Two statisticians in the CSO shortlist the initial posters based on a consistent set of judging criteria. This year 42 posters went forward to the second judging phase. The second phase of judging involves a more rigorous review of the shortlisted posters. Between 15 and 20 CSO staff from a variety of backgrounds (gender, age, grade, section, location) use the same set of judging criteria used by the initial judges. In 2013, following the second phase of judging, 16 posters were shortlisted to go forward to the final judging panel. In both of the initial judging phases, judges are able to review posters online from their desks. In the final phase, the panel of judges consists

of a CSO chair and a number of external, independent judges from various mathematics, statistics or teaching backgrounds. This panel meets for a day, and again using the same set of judging criteria as in the first two judging phases, selects the winners and runners-up. For this final stage, posters are printed onto A1 sized cards and mounted on the office walls for independent scrutiny by the judges. Following individual grading, the individual scores are totted and a provisional order of merit is proposed. The posters are scrutinised as a group to reach consensus of the final order of merit. The chair of the final judging panel then discusses the overall quality of the posters to determine any feedback messages from the judges to the students to improve the quality of posters in future competitions. The feedback from the 2013 competition is included in Appendix 2 for illustrative purposes.

When winning posters are announced, links to the winning and shortlisted posters are posted on the CSO website. For example, in 2013, 16 posters were published [10]. Posters are listed as first, second, third and order of merit. Students, teachers and schools are acknowledged. Certificates are sent to all students who submitted a poster. Special certificates are awarded to students and schools for posters placed first, second and third place or awarded an order of merit.

During 'Maths Week' which usually takes place in October each year, a special prize giving ceremony is held in the Department of Education headquarters to which students, teachers, parents, educators, the media and other interested parties are invited. A government minister attends and awards the John Hooper Medal for Statistics and presents the prizes for the competition. At this event the next John Hooper Poster competition is simultaneously launched. The highlight of this ceremony is when the winning students present their findings and results. The CSO CensusAtSchool release is also published and launched at this ceremony. Again the opportunity is taken to launch the new CensusAtSchool questionnaire. Invited speakers encourage students to continue to pursue their interest in mathematics and statistics. The events of the day are recorded and a YouTube video is later loaded onto the CSO website [11]. This event is usually a very happy, feel good day with positive media coverage.

### *THE CENSUS STORY*

Running up to Census 2011, the CSO produced online educational resources for both Primary and Post Primary Schools [12]. A series entitled '*The Census Story*' with lesson plans, designed by primary school teachers and with increasing degrees of complexity were produced for First to Sixth year classes [13]. The lesson plans were specifically developed to incorporate the principles of the primary school curriculum and were piloted in classes before being rolled out for Census 2011. Likewise, for Post Primary Schools specific Census 2011 resources were developed for the following subjects areas: History, Civics, Social and Political Education (CSPE) and Geography. Again these resources were developed and piloted by Post Primary school teachers to support specific post primary school curricula. These resources were a great success and Census Charlie (see Appendix 3) was a popular character with Primary School students.

### *AN POST RÁS PROJECT*

In 2012, to celebrate the 40<sup>th</sup> anniversary of a national cycling race 'An Post Rás' an online resource was developed [14] in partnership with An Post Rás, the RSSCSE, CSO and the NCTE. A detailed lesson plan and support documentation guided students and teachers through a plan on how to collect data, process data and discuss the data in order to answer the question 'Where will you view the An Post Rás?' The resource has been updated this year to look at the An Post Rás 2013 route. Again this tool is open to both Primary and Post Primary students, though the lesson plan is aimed at Post Primary school students.

Since launching the Education Outreach Programme, thousands of Primary and Post primary school students have been introduced to and have engaged with statistics and mathematics. Only time will tell whether these novel and innovative tools have contributed to the improvement of statistical literacy in Ireland.

### THIRD LEVEL AND CONTINUED PROFESSIONAL DEVELOPMENT

With regard to Third level and continued professional development the Education Outreach Programme has achieved a number of key objectives. A Professional Diploma in Official Statistics for Policy Evaluation was successfully launched in the academic year 2012/2013 in partnership with the Institute of Public Administration (IPA). Also, the CSO runs two seminar series: The Business Statistics Seminar series, first run in 2008 and the Administrative Data Seminar series which began in 2009 both sets of seminars educate and develop relationships.

#### *THE PROFESSIONAL DIPLOMA IN OFFICIAL STATISTICS FOR POLICY EVALUATION*

The *Professional Diploma of Official Statistics for Policy Evaluation* was launched in 2012 by the CSO in cooperation with the IPA to address the real need for improved statistical literacy and analytical skills to support evidence informed policy making [15]. The diploma is a one-year, part-time programme and is targeted at the public service, specifically those who use (or should use) data to formulate or assess policy. The award is a level 8 National Framework Qualification special purpose diploma worth 20 credits [16].

The diploma is intended to introduce participants to important Irish and international official statistics that will help them better understand the structure and trends of Irish and international economies, societies and environments and their respective inter-dependencies. The course is designed as a practical 'hands-on' course where students will be shown how to access and interpret official statistics. Considerable emphasis is also placed on presenting and visualising statistics so that useful policy relevant information can be derived. Students are also introduced to UN Fundamental Principles of Official Statistics [17], European Statistics Code of Practice [18], best practice principles of data management and metadata and the broader principles of sound evidence informed policy formulation and evaluation.

There are four desired learning outcomes for participants:

- Increase their knowledge and understanding of Irish economy and society, informing their opinions regarding current developments;
- Learn how to find and extract statistical information, so they can conduct their own research and analyses;
- Develop data analysis techniques and skills so that data are properly used;
- Improve presentation skills and in particular, learn how to present analyses or business cases to peers in a professional manner using supporting statistical evidence.

In many respects, the main aim of this programme is to take the fear and mystery out of official statistics. The diploma is not designed as a quantitative methods or technical statistics course but rather to teach an appreciation of statistics and how they can be used to find and present key messages. The first cohort of students sat their exams on April 19<sup>th</sup>, 2013.

#### *SEMINAR SERIES*

The CSO currently runs two seminar series: A Business Statistics Seminar series [19] and an Administrative Data Seminar series [20] along with occasional ad-hoc seminars, for an example see [21]. The philosophy underpinning these series has four central pillars:

- to make users and potential users aware of all the data already available ;
- to demonstrate how these data could be used by providing case studies or illustrations of analyses;
- to improve our relationships and develop a network of researchers, policy makers, academics and other stakeholders; and
- to market new products or datasets.

The Business Statistics Seminar series was launched in 2008 with the specific aim of promoting awareness and use of business statistics. This series provides a forum to showcase new and innovative work developed by CSO (such as Family Business Statistics [22], Aviation Emissions [23] and Job Churn [24]) and provides an informal space where users, respondents and CSO staff can meet face-to-face to discuss matters of mutual interest. The seminars are explicitly designed to make the link between statistics and policy relevant information. Consequently

speakers include not only statisticians from CSO but also data users, such as researchers or policy experts, who are encouraged to raise issues about the data and demonstrate the uses to which statistics can be put.

The Administrative Data Seminar series was launched in 2009, with the particular aim of demonstrating and marketing new statistics that have been derived from administrative data. This series also advocates for the development of a functioning integrated public-service statistical system, highlighting the importance of rational data management and classifications. Barriers to progress, such as the absence of post codes or unique business identifiers, are also highlighted.

By and large these seminars have been welcomed by the various user communities as useful and positive developments. A new Social & Demographic Statistics Seminar will be launched in early 2014.

## MEDIA AND WIDER SOCIETY

*“The key to good decision making is not knowledge.  
It is understanding.  
We are swimming in the former.  
We are desperately lacking in the latter.”*

Gladwell [25]

Finally the CSO actively engages with the media, Statistical Liaison groups and the Oireachtas (The Irish National Parliament) as part of our Education Outreach Programme.

### STATISTICAL LIAISON GROUPS

Over the past number of years, CSO has established a number of standing statistical liaison groups (Agriculture, Enterprises, Energy, Prices, Tourism and Transport) [26]. While the primary purpose of the liaison groups is to improve communications with both users and data providers, they also play an important role in agreeing common objectives, coordinating statistical activity across the wider public service, prioritising competing demands, managing expectations, and identifying opportunities for collaboration. Membership includes relevant Government departments and agencies, representative industry groups, members of the research or academic community and often colleagues from various Northern Ireland government departments and institutions.

The Tourism Statistics Liaison Group is an interesting example, as in 2012 this group was formally renamed the All-Island Tourism Statistics Liaison Group to reflect the balanced membership from Northern-Ireland and Ireland and the all-island scope of the discussions and coordination.

To encourage transparency and accountability, the minutes, papers and presentations from liaison group meetings are published on the CSO website.

### OIREACHTAS BRIEFINGS

The National Parliament or Oireachtas in Ireland consists of the President and two Houses: Dáil Éireann (House of Representatives) and Seanad Éireann (the Senate). In 2012, the CSO launched a formal programme of briefings to the Houses of the Oireachtas to try and improve the flow of information to national parliamentarians. This initiative is still in its infancy but to date, CSO have given a number of plenary briefing sessions and some additional briefings to specific joint Oireachtas committees. All of these briefings are published on the CSO website [27].

As noted earlier, the outreach programme is viewed as a long term investment, so many of the benefits or payback may not be fully apparent yet nor will they be for some years to come. Nevertheless, initial reaction and comment has been positive. Although our efforts to communicate with the public and better promote our products will be an ongoing pursuit, feedback suggests that users appreciate the efforts we are making.

Hopefully these projects are introducing the next generation of potential users to official statistics in a fun way that will encourage students to remain users in the future. The diploma and

the Oireachtas briefings speak to some of our most important users – the public service and the key decision makers. By providing them with the tools to make decisions and by illustrating the importance of good quality information, it is hoped we will create a mutually beneficial situation for everyone.

## CONCLUSION

Official statistics are a very valuable public good but all too often they are an undervalued and underutilised good. Unlike most other goods or services, statistics increase in value rather than diminish the more they are used. Correspondingly, if official statistics are not being used then they are worthless and their compilation was a pointless exercise and a waste of valuable resources. What official statistics do have in common with most other goods or services however is they need to be actively marketed and promoted. If valuable data are not being used then the producers must accept some culpability or blame.

The aim of the outreach programme ‘*Investing for the Future*’ is to address this issue and promote not only the availability of official statistics but also to provide some guidelines or illustrations on how those data could be used. By taking the fear and mystery out of statistics, we hope their use will increase. This programme is viewed as a long term investment, but an investment worth making, if it encourages the use of good quality information to formulate and assess public policy decisions.

All of the initiatives described above are individually worthwhile, but collectively they help to strengthen the Irish official statistics brand. The importance of brand should not be underestimated. Public trust in official statistics in Ireland remains high, but this trust cannot be taken for granted. Apart from protecting the independence and quality of official information, data must be accessible and relevant. The CSO (and other NSIs) must remain vigilant and ensure modern dissemination tools are being exploited and products are being promoted.

Collaboration is the key to success. CSO did not have the skills sets or broader contextual understanding, to unilaterally launch the projects described above. Not only has collaboration improved the service we are delivering but it has also introduced us to new networks of talented, enthusiastic and committed people with aims that overlap with our own.

It seems fitting that we should finish where we began, quoting Pink Floyd.

*Can you help me?  
Hey you, don't tell me there's no hope at all  
Together we stand, divided we fall.*

Pink Floyd – Hey You

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*Appendix 1 – Image of John Hooper Medal*



## **Appendix 2 – John Hooper Medal 2013:**

### *Feedback from the judges on the posters*

Some feedback from the Chair of the final judging panel on the posters, itemised by the judging criteria, could help students improve future statistical work.

- *Clarity of message*

*Make sure that the flow of the poster is easy to follow. If you are using a coloured/patterned background on the poster, check that the text is still legible over the background. It is also important to remember to proof-read your poster, as simple spelling mistakes can take from the overall quality of the poster.*

- *Data collection*

*Give clear information about the sources of the data, sample size etc.*

- *Graphs and tables*

*All graphs should have a title and axes should be clearly labelled.*

- *Presentation*

*Overall, the quality of the presentations has improved year on year.*

- *Creativity/Importance*

*The theme this year was Agriculture and the judges were very impressed with the range of topical subject matters within this theme that the students selected for their posters. The majority of posters submitted this year consisted of survey based projects – the judges would also like to encourage students to consider conducting experimental based projects.*

## **Appendix 3 – Image of Census Charlie**

