

## HOW TO COLLABORATE WITH THE MEDIA TO ENHANCE STATISTICAL LITERACY OF THE GENERAL PUBLIC

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*The grand societal challenges we face, all require that citizens can understand and interpret quantitative information. Firstly, these main concepts of statistics and data analysis should be taught in schools. Additional approaches are required however: a large part of society is not statistically literate and not attending traditional education anymore. For this second group, we see a key role for media: they are experts in communicating to the general public. Yet until recently, most journalism schools did not educate their students on statistical literacy. This brings us to the challenge: How to collaborate with the media to enhance statistical literacy of the general public? Our goal is to present a preliminary set of guidelines and resources that individual countries can adopt to increase statistical literacy.*

### INTRODUCTION

Statistical Literacy can be defined as the ability to review, interpret, analyze and evaluate written materials, and to detect errors and flaws therein. (Schild, 2002). Statistical illiteracy then is the inability to do so.

Statistical illiteracy is a serious problem. Without statistical literacy, people base their decisions on incorrect interpretations of statistical information. For instance, when people claim causality when only correlation has been demonstrated. An alarming example is when parents decide to not vaccinate their children anymore, because they think autism is caused by vaccinations. They base their decision on the correlation between vaccinations and autism rates. In the previous decades, vaccination rates had been increasing, while diagnosed autism rates have increased as well; a correlation. However, in randomized control trials that have been undertaken over the past decades, no evidence has been found that vaccines cause autism. (Allen, 2010)

Yet people continue to believe that because they see a correlation, vaccines must be causing autism. Relying on such incorrect statistical conclusions, vaccination rates in parts of the US have dropped from 94% in 2004 to 42% in 2014, causing the worst measles outbreaks in decades. (Washington Post, 2017)

Over the past years, different organizations have undertaken efforts to increase statistical literacy around the world. For instance, National Statistical Offices (NSOs) and the International Statistics Literacy Project (ISLP) - a long-running international project that started in 1994 - have undertaken various projects, targeting several audiences using varying methods, ranging from online resources and school competitions to outreach programs to media and small businesses. (Helenius, 2010, Townsend, 2008)

When discussing statistical literacy, focus is often directed to students in traditional education. Taking (high school) students as the main target group for increasing statistical literacy is a sensible option. These students still need to learn the material and reaching them is relatively easy and feasible as their teachers can coordinate and facilitate the activities. However, this often means less attention is being paid to the statistical literacy of the general public.

Ironically, we have been unable to find good statistics on the size problem of statistical illiteracy rates for the general public. Even in absence of quantitative evidence, we feel it is safe to assume a large group of people leaves school without being sufficiently statistically literate. Additionally, knowledge dissipates. Over time, people will forget important but unused concepts. (Murre, 2015)

Combining these two arguments, it follows that the largest group of statistically illiterate citizens is not in traditional education anymore. Yet it is people within these demographics that make the choices that affect and shape our societies to great extent.

Therefore, we claim that in addition to targeting students, we need to extend our focus to the general public who is not in traditional education anymore. In this paper, we propose how to reach them: through which channel, through which medium and how to start the required

collaborations. We close off by providing concrete recommendations for ISLP country coordinators and NSOs, so we can reach the general public all over the world in a concerted effort.

#### THE CHANNEL: (DIGITAL) NEWS MEDIA

In order to reach the general public who is not in traditional education anymore, we have decided to focus on (digital) news media. We believe this is a good choice for the following reasons:

1. *Wide reach*: the (digital) news media have access to an incredibly large audience.
2. *The right audience*: a lot of people in the general public read news of some sort. Especially if we include non-traditional sources of news, such as social media, a large part of the general public can be reached.
3. *Good communicators*: journalists from the news media and bloggers and vloggers on social media share the trait that they are well-versed in capturing the attention of the general public. As statistics educators, we can and should learn from them. By collaborating with the media, we can combine their communication skills with our skills in explaining the complex concepts in statistics.

However, not many journalists are statistically literate themselves. In addition, even for statistically literate journalists, it remains difficult to attract the general public to read about complex statistical concepts, as not many people are – unfortunately – intrinsically motivated to learn about these issues. The question we have been trying to answer of the past two years is: how can we best reach the general public when working with the (digital) news media?

#### THE MEDIUM: INTERACTIVE EXPLAINERS

We believe interactive explainers should be the medium of choice in many cases for explaining complex problems. Interactive explainers are digital, visual animations, generated by code, where the user controls the pace of the explanation. Interactive explainers may work better than text or static images because animations guide the eyes and tie concepts to each other. Because the user can guide the pace, we can better prevent cognitive overload.

##### *Benefits of interactive explainers*

We claim interactive explainers are well-suited to help the general public appreciate and understand statistical concepts. We present five reasons:

1. *Short*: using interactive explainers we can explain complex concepts such as sampling variation and confidence intervals in less than three minutes. This is essential, as the general public are unlikely to invest more time.
2. *Scale*: the explainers are digital and therefore a large number of people can be reached without increasing required resources.
3. *Relevant*: when the explainers are well-designed, they can quickly be adapted to new circumstances. This way, they can tie into relevant news events, making the explanation much more relevant to the general public.
4. *Reusable*: in addition to the news media, the interactive explainers can also be used in schools and universities.
5. *Low marginal costs*: once an interactive explainer exists, it can be changed very quickly and deployed against minimal costs. Changing the explainer on sampling variation in election polls to fit another country takes us less than 30 minutes. If you divide the total development costs by all the people who have used the explainer, marginal costs are low.

##### *Our experiences*

In 2017, we have developed an interactive explainer about sampling variation in election polls. (Bellinga, 2017) This explainer has been embedded in two news articles: in a Dutch online news platform and a Czech news website. (De Correspondent, 2017, iROHZLAS.cz, 2017), It has also been linked to by the Dutch National News. (NOS, 2017)

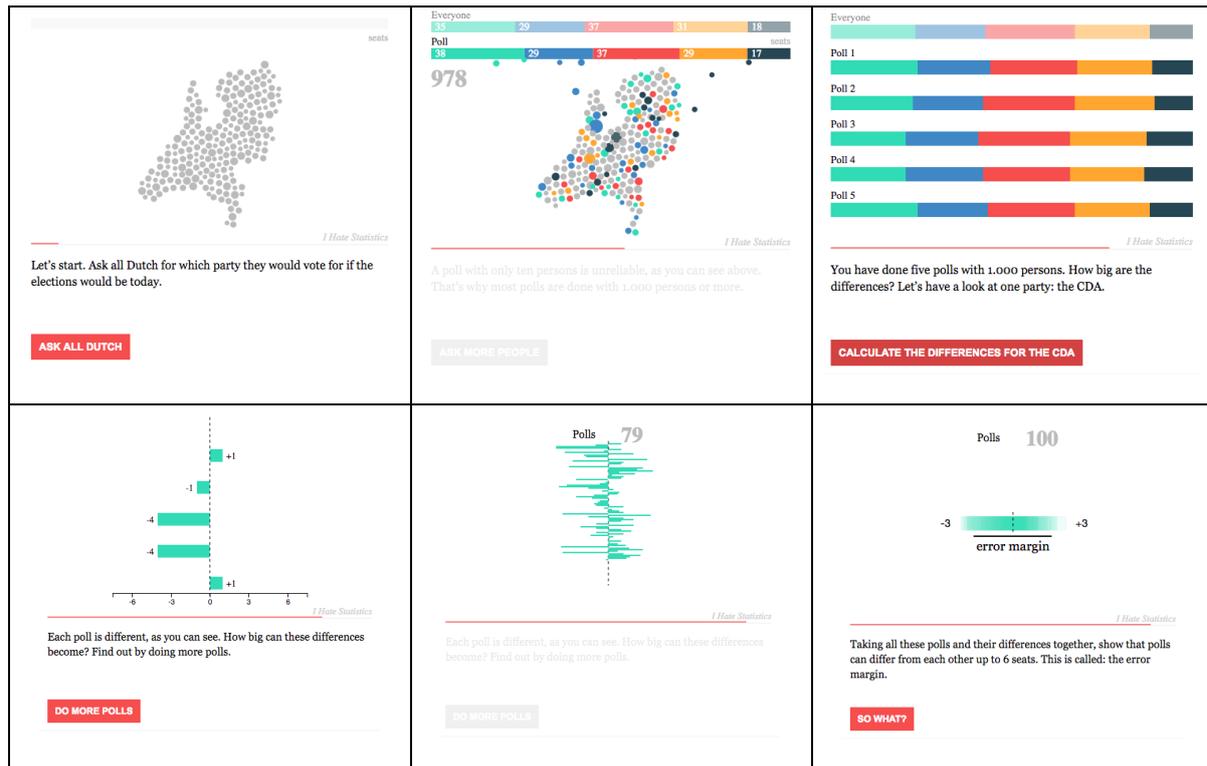


Figure 1: six screenshots from the explainer on election polls for the Dutch elections, showing how users can simulate their own polls and in doing so experience the concept of sampling variation.

Results have been positive. In total, 15.635 people have started the explainer (around 50% of the readers of the articles). Completion rates have been higher than anticipated: 8.453 users (54%) have gone through the entire explainer and finished all the 13 steps. This is a remarkably high number, compared to other interactive graphics in news media, such as the New York Times, which are reported to center around 15% (Baur, 2017). We believe this is due to the story-like nature of the explainer that pulls users through all the steps of the explanation.

### Challenges

Of course, interactive explainers have their challenges as well. Based on our experiences, the four most important ones are:

1. *High development costs:* a major disadvantage is the high number of hours it takes to develop an interactive explainer. In interviews with Dutch news media, the small capacity of developers at news organizations is consistently mentioned as a barrier to adoption.
2. *We don't know who the audience is.* We assume current users that complete the explainer are not entirely representative for the broader population. One may assume that those that read articles on how election polls work, are inherently more interested than those we do not even start reading the article. Even then, this may still be an interesting group to target, to trigger further interest.
3. *Difficult to test whether the material is being mastered:* we may assume that people who completed the explainer now grasp the concepts. But without testing, it is hard to be sure. Assessing mastery could be done with a pre- and post-test, but this would likely result in a considerable drop-off in start and completion rates.
4. *Publishing explainers in news media is difficult:* news rooms are always busy, especially in times that a certain topic is temporary highly relevant. Therefore, it can be challenging to partner with the news media and embed the explainer in an article.

These initial experiences with interactive explainers demonstrate that – if one manages to develop an explainer despite the high development costs and manages to collaborate with news organizations despite their busy schedule, it is possible to reach and engage the general public on statistical concepts on a large scale.

## THE PATH: COLLABORATE WITH JOURNALISM SCHOOLS

As we have argued, we should reach the general public through collaborations with the news media. We have shown we can help thousands of people learn about statistical concepts through interactive explainers.

But developing interactive explainers with the news media can be challenging, as news organizations often do not have sufficient resources to cover the development costs of an explainer and because they always lack time. Because of these reasons, we have started to look for intermediate methods of starting the creation and dissemination of interactive explainers.

To this end, we have identified *journalism schools* as a partner uniquely fitted to collaborate with.

### *Benefits of collaborating with journalism schools*

We see three benefits of collaborating with journalism schools:

1. *Journalism schools are in need of good resources on statistical literacy.* Current resources on statistics are often abstract or focus on academic research practices. Material that connects to real-life situations for journalism students exists but is difficult to find. By working together with journalism schools, we can help the schools in finding and developing new, tailored resources.
2. *Journalism schools can function as a safer test environment.* Publishing a new explainer in the national news is a highly stressful event. Technical issues may play up and one can quickly lose the precious trust of the news media. Journalism schools form a safer environment to test new materials. The classes are often relatively small, so teachers can easily gather experiences of students. As these students will become tomorrow's journalists, most of them are good communicators. They are likely to have good feedback that can be used to adapt the materials before they are deployed to the broader public.
3. *Journalism schools have close connections to media organizations.* The people working at the news organizations often graduated from one of these journalism schools. The teachers often still know them well. When the teachers have used a resource which they are enthusiastic about, they can share it with their former students.

### *Challenges*

In collaborating with journalism schools, we have mainly encountered the following challenge: *dedicated course or teacher is not always present*: although the demand and attention for data-journalism has risen incredibly over the years, quantitative skills are still not a basic requirement at every school. Sometimes these schools do want to extend their trainings on these issues, but it is not clear who in the organization should take this up.

## PROPOSED ACTION PLAN FOR ISLP COUNTRIES

Based on our experiences, we have formulated a plan that ISLP country coordinators and NSOs may choose to adopt. The goal: start collaborations with journalism schools to develop noteworthy and relevant explainers on statistical concepts for the general public and test them with journalism students. Our recommendations are to take the following steps:

1. Map the state of the problem: is there a statistical literacy gap to be filled in your country? How can this be seen? Why is this a problem? Why should people care?
2. Create a list of all the journalism schools in your country.
3. Contact these schools and find out whether interpreting and communicating quantitative information is already on their radar.
4. Find out who the responsible teacher is for the quantitative research skills or data-journalism course(s).
5. Contact these teachers and ask them how they are currently addressing statistical/quantitative literacy

6. Explore whether there are opportunities for collaborations. The first step is to identify, together with the teachers, the required learning goals and assess the current skills of the students.
7. Search for – or when necessary, create new - relevant and interesting resources (for instance: explainers) that the teachers can use in their classes. Ask the students for feedback on if and how this explainer could be used for the broader public.
8. When an explainer has received sufficient feedback and traction from the journalism students, reach out to the news organizations. Use the contacts of the journalism schools if needed.

We are currently going through these steps ourselves. Initial feedback from journalism schools seems positive, as they are often looking for new ways to engage students in statistics and quantitative communication.

## CONCLUSION

Statistical illiteracy remains a problem that needs attention. We argue that in addition to efforts targeted at students, we need to focus more on the general public who is not in traditional education anymore. We propose to further investigate the usage of interactive explainers as a suitable medium for engaging people. We believe the general public can best be reached through the news media. By starting collaborations with journalism schools, resources (for instance, explainers) can be developed and tested, before they are introduced to a wider audience. We have captured our recommendations into a preliminary list of steps that country coordinators of the ISLP and NSOs can follow. We hope that by international cooperation, by sharing our experiences and resources, we can collectively increase statistical illiteracy of citizens all around the world.

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