



Key success factors in improving statistical literacy: Experiences from the International Statistical Literacy Project

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Abstract

The International Statistical Literacy Project (ISLP) is intended to contribute to the promotion of statistical literacy across the world; among children, adolescents and adults from all walks of life. To this end, the ISLP supports, creates and participates in statistical literacy and promotion activities around the world. The ISLP is operated under the aegis of the International Association for Statistical Education (IASE), the education branch of the International Statistical Institute (ISI).

The ISLP runs several different competitions involving schools, companies, universities, statistical offices, and many other institutions. The most well-known of these competitions is the International Poster Competition, which invites school students from around the world to design a statistical poster. The poster can be about any topic reflecting or illustrating the usage analysis, interpretation and communication of statistics or statistical information.

Statistical literacy is complex and multifaceted. In every country, education and numeracy is a function of a multitude of factors including culture, history and societal norms. Nevertheless, since the launch of the ISLP in 1994, a number of patterns have emerged to suggest there are some common or universal success factors in running a statistical literacy competition. This paper outlines some of those factors. These factors have been identified from our own experiences running the ISLP competitions and from articles submitted to the annual ISLP newsletter. As noted above, education and statistical literacy are complex phenomena, and so this is not an exhaustive list of success factors or for that matter a formula for success, but rather an overview of some recurring themes across many countries participating in the ISLP competition around the world.

Keywords: ISLP; statistical literacy; key success factors; improving statistical literacy.



1. Introduction

The mission of the International Statistical Literacy Project (ISLP) *'is to support, create and participate in statistical literacy activities and promotion around the world'*. It is run under the auspices of the International Association for Statistical Education (IASE) which is the education section of the International Statistical Institute (ISI). The ISLP is comprised of several projects, each of them focused on one area of statistical literacy. Each project is coordinated by expert volunteers (the project coordinator) who highlight news, compile resources, maintain a web page for their project and execute activities dedicated to increase statistical literacy in their area of expertise. The best known of these projects is probably the ISLP 'Poster Competition' (ISLP; 2015), which invites school students from around the world to design a statistical poster, illustrating their ability to use, analyse, interpret and communicate their findings. This competition is intended to introduce children to the joys of investigation and research.

Statistical literacy is complex and multifaceted. In every country, education and numeracy is a function of a multitude of factors including culture, history, economics and societal norms. Nevertheless, since the launch of the ISLP competitions in 2007, a number of patterns have emerged to suggest there are some common or universal success factors in running a statistical literacy competition.

This paper outlines some of those factors. These factors have been identified from our own experiences running the ISLP poster competition and from articles submitted to the annual ISLP newsletter (which can all be found online¹). As noted above, education and statistical literacy are complex phenomena, and so this is not an exhaustive list of success factors or for that matter a formula for success, but rather an overview of some recurring themes across many countries participating in the ISLP competition around the world.

2. Statistical Literacy Competitions

Mathematics has had a long tradition of competitions, such as the Mathematics Olympiads. However, there is no such tradition in Statistics. Nowadays, statistics educators see such a need to encourage statistical literacy among students as statistics requires an experimental environment with real data to answer relevant questions about the real world (Sanchez, et. al, 2011). After all, evidence-based decision making at all levels of society is impossible without access to information and knowledge. It also requires the ability to understand how the statistical information came about and a critical view about bad and good statistical information. In fact, statistics is more than a branch of mathematics supported by data analysis: it involves experience planning and problem-based matters that need careful thinking and reasoning (Garfield, 2002; Garfield and Gal, 1999).

Statistical offices have embraced the idea of organizing statistical competitions based on real data (Sanchez, et. al, 2011). In Italy, the Italian Statistical Society and the National Statistics Office organize a national competition for the best work research in statistics. The collaboration includes provision to students and teachers of statistical data and a guide to the use of data and metadata. In Portugal, the ALEA project joins together the statistical office and a secondary school and launched "ALEA's Challenges", an on-line competition containing everyday life problems based on daily news. There are many other statistical literacy competitions running in many countries of the world.

The Australian Bureau of Statistics, in partnership with several Australian universities, sponsored a poster competition. Poster competitions are increasingly becoming a popular way of motivating

¹ <http://iase-web.org/islp/Publications.php>



students and teachers to pursue statistical literacy. The main goal of the International Statistical Literacy Competition, running from 2008, is to increase awareness of Statistics among students and teachers throughout the world, to promote statistical literacy resources and to bring together parties interested in statistical literacy in each country. Students have to demonstrate:

- to work as a team
- to investigate real questions using data
- to use calculation and graphical skills
- to interpret statistical result
- to develop written communication skills

3. Some key success factors in ISLP poster competition

Given the complexity of statistical education, it comes as no surprise to learn that a key factor of success is institutional cooperation. No one institution, whether statistical or educational, can optimize outcomes alone. However through institutional cooperation, the ability to successfully run a statistical competition and address deficiencies in literacy improve immeasurably. Be it to raise finance, provide data, bring technical or logistical expertise or assist in marketing and media capture, many institutions can bring something useful to the table. When we look across countries that are participating in the ISLP poster competitions, we see that institutional cooperation is a feature of many of them. For example, India, Japan, Russia, Spain, Italy, Ireland and New Zealand have all identified institutional cooperation as a key feature of their model to improve statistical literacy. Typically, we see these institutions include: National Statistical Institutes (NSIs), secondary and tertiary educational institutes, Government departments for Education (and/or Science/Technology) and other organisations, such as Mathematics Curriculum Boards. Some countries have also acknowledged the support of other government agencies (beyond statistical agencies) in running their programmes (Ireland, Japan, Poland and Russia).

Another important factor is celebration, a very significant feature of education. Many countries make great efforts to celebrate their competition winners. There are, no doubt, many reasons for this. First and foremost, it is important to recognize the achievements of the students who have participated and won. Such events also help to raise awareness of the need to improve statistical literacy among the community. They also help to attract media attention, which in turn, helps to attract more participants and highlight the efforts of the institutions involved. This aspect is noted by Japan, India, Ireland, Poland and New Zealand. Some countries use prize giving ceremonies to allow students to present their work to peers, parents, teachers and in some cases, even Government ministers, university or NSI presidents. Countries have adopted slightly different approaches vis-à-vis awards. Not all countries award prizes, but rather give other awards. India, Ireland and Japan all present prizes (Money, medals or other awards) but this approach appears to be more the exception than the norm.

The ISLP poster competition is biennial, however many countries run national competitions separately (Finland, Ireland, Italy, Japan, Korea, Russia and Spain). Many of these competitions predate the ISLP - e.g. Japan has run a national statistics competition since 1953 - (Watanabe, 2014). Often these competitions are designed to seamlessly fit with the ISLP parameters and rules, so that national winners can represent countries at the ISLP. Typically these national competitions are held annually. The advantages of running a national competition are many; for example, it often means it is easier to maintain organizational structure and the interest of schools and media. An independent national framework often provides a better opportunity to provide feedback to students and develop teaching resources for teachers. In particular, both Finland and Ireland have made great efforts to provide feedback to students so that they can learn from their mistakes but also that other prospective students can learn what makes a good poster. Feedback also safeguards transparency, as all students can view jury feedback on all posters online.



4. Conclusions

The ISLP Poster Competition is built on the traditions and experience from the more established mathematics competitions. The competition is designed to encourage statistical literacy among students by creating a space where students can explore real world issues by experimenting with real data. In doing so, the ISLP hopes to foster an open and inclusive global statistical community that includes not only statistical and academic institutions but also schools, government departments, libraries and anyone else who is interested.

The Poster Competition invites school students from around the world to conduct a small scale research and to design a statistical poster about it (ISLP, 2015). Posters reflect or illustrate usage analysis, interpretation and communication of statistics or statistical information. Today the ISLP poster competition operates in 31 countries. These competitions play a small but important role in bringing statistics and the spirit of enquiry and exploration to children all around the world. Bringing statistical literacy to young minds will better prepare future generations for life in a world, increasingly reliant on information and data. By helping children to understand what is going on, we are contributing to their ability to fully participate in life and citizenship.

As noted at the beginning of the paper, this is not an exhaustive list of critical success factors. It is simply highlighting some common factors that appear to have contributed to the success of their ISLP competition in several countries. These factors are largely identified from articles submitted to the ISLP newsletter and so may not provide a comprehensive list of factors or countries associated with a particular factor. Our hope is that this paper may prove useful for countries considering becoming involved in the ISLP competition or simply contemplating how to improve statistical literacy.

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