

CALL FOR PAPERS: Building future generations of statisticians

The Statistics Education Research Journal (SERJ), a journal of the International Association for Statistical Education (IASE), announces a special issue on the topic of Building connections and future generations of statisticians, currently planned for May 2019.

Deadlines:

- *Expressions of intent (including abstract) by 15 December, 2017*
- *Full papers by 15 July, 2018.*

The Guest Editors for this special edition will be Peter Howley (peter.howley@newcastle.edu.au), Ayse Aysin Bilgin (ayse.bilgin@mq.edu.au) and Reija Helenius (reija.helenius@stat.fi), with current SERJ co-editor Manfred Borovcnik (manfred.borovcnik@aau.at).

1. Background

Statistics and the interpretation of data are ubiquitous in the knowledge society and consequently statistical literacy is assuming an increasingly prevalent role in education at all levels. However, the perceptions and general appeal of statistics require methods to keep students interested and overcome initial hurdles to gain their interest or engagement (Howley, 2008; Howley, 2009). Further, statistical anxiety is increasingly a major issue which has been identified as a deterrent for young people to access and succeed in university degrees (Onwuegbuzie & Wilson, 2003; Williams, 2010) with cross-country comparisons indicating this is not unique to any country (Chiesi, Primi, Carmona, 2011). In particular, statistical anxiety seems to affect females and students from diverse backgrounds (Bui & Alfaro, 2011; Onwuegbuzie & Wilson, 2003). Early intervention for improving access to university is crucial, particularly for low socio-economic status (SES) students (Tai, Qi, Maltese & Fan 2006; Barnett, 2011; Maltese & Tai, 2010). A significant body of research also indicates that mathematical and statistical unpreparedness is a major factor affecting entry to and persistence in the traditional Science, Technology, Engineering and Mathematics (STEM) disciplines for students from low SES regions and culturally diverse backgrounds (Bonous-Hammarth, 2000; Clewell, 1992; May & Chubin, 2003). However, despite this research dating back decades, and the proliferation of resources to teach *mathematics* available through digital media and the internet, data worldwide shows that *statistics* is also considered a significant roadblock for many low SES students (Bell, 2003; Petocz et al., 2007).

It has been almost a decade since Google's chief economist, Hal Varian, first publicly referred to statistician as the sexy job of the next decade, identifying how Google was building their numbers of statisticians and statistics-oriented employees. There have since been significant reports identifying the predicted relative shortfall of adequately skilled individuals for the new Big Data age (Manyika *et al*, 2011; Puang-Ngern, Bilgin, Kyng, 2017), with indications that "(by) 2018, the United States alone could face a shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million managers and analysts with the know-how to use the analysis of big data to make effective decisions." (Manyika *et al*, 2011).

Students need to engage with and become more greatly interested in the analytical, statistical and machine learning aspects needed to fill the increasing need for such Big Data skills. Although universities are introducing new degree programs to address this issue (Kyng, Bilgin, Puang-Ngern, 2016), earlier appreciation of and engagement with statistics is lacking.

More recently national and international initiatives within national societies, across and involving industry and the education sectors, have focussed on STEM-based activities and fora

identifying or discussing the need for statisticians to fulfil the increasing demand in the Big Data Age. There has been a crescendo of discussion surrounding the need to address this shortfall of supply of statisticians in light of the Big Data Age as well as more recent *post-truth* and *fake-news* discussions.

Australia's former Chief Scientist has commented that "when they do study them (the sciences) at school...the best way to teach inspirationally is to teach it the way it's practised." (Chubb, 2015). However, school teachers have rarely if ever experienced statistics in practice, nor understand the varied and wide reach of statistical thinking, techniques and applications, and its importance to study design and inference. Their knowledge about the practicing statistician is at best limited, their focus has been on the many other topics and aspects of teaching. When it comes to teaching statistics, teachers usually concentrate on the theory but not the practical applications of statistics; supposedly it is easier to teach and assess the theory compared to practical aspects and applications of statistics.

Internationally, initiatives and activities have commenced and are developing towards engaging schools, tapping into the supply chain of potential undergraduates, incorporating industry, academics and a multitude of resources and support. The aims of such activity include showing the beauty of statistics in everyday life, creating a comfort zone to deal with data, killing the statisticophobia beast (Dillon, 1982), and finally encouraging new generations to be confident about data analysis. But what are those activities, have they been successful, what have we learnt from such attempts, past and present, and where should this lead us?

This special edition will bring the spotlight to such activities internationally in an attempt to consolidate existing experiences, resources and knowledge towards ensuring the diversity of skills, efforts and outcomes are recognised and utilised and help to develop increased and potentially more focussed collaborations and successes. We aim to enable educators across primary, secondary and tertiary sectors, and industry and national societies to learn from one another's experiences and potentially reduce the unnecessary duplication of efforts, rather supporting the higher-level learning as a first stage of engagement for creation of increasingly innovative initiatives.

2. Themes and Possible Topics

The central theme is 'initiatives in developing future statisticians'. This does not include the development of program content for delivery within tertiary education, rather it refers to the surrounding 'outreach' initiatives and supporting mechanisms for increased engagement and interest in (attraction to) the field of statistics. Such activities aim to arouse interest from the wider community and schools, increase the numbers of individuals engaging with statistics, recognising its value and wanting to be part of the next generation of international leaders in the field, whether expressly in statistics or in conjunction with other fields of inquiry, or to at least be part of those advocating statistics as a career and accessible endeavour. Success stories and failure stories are welcomed since they might enlarge the vision about what can be done to get the students and teachers interested in statistics. It is vital to accompany the results by research in order to draw evidence-based conclusions from the experience.

With the focus on 'outreach' activity and engagement, this special edition will draw upon articles which show evidence of:

- Collaboration with industry, with professional societies, between institutions and others such as African Data Initiative, Japanese Poster competition, ISLP, African Institute for Mathematical Sciences activities, Pakistan Civil Service Academy, Statistical Houses in Iran,

Australian Poster Competition and US Undergraduate Statistics Project Competition (USPROC)

- Innovative approaches to develop love of statistics for students and society at large (citizens)
- Overcoming statistical anxiety to increase connection with statistics
- Addressing disadvantaged groups (e.g. low SES individuals, females, indigenous people) to increase connection with statistics
- Success stories
- Failure stories (e.g. why the initiative failed, what needs to be done in the future to make them successful)

Articles must address the key aims of increased connection with community, schools, and industry.

Key areas may include local, national and international:

- competitions and awards;
- school-based activities;
- collaborative efforts to arrest the shortfall;
- innovative activities to increase numbers of students choosing to study statistics;
- initiatives which bring a focus on statistics towards the afore-mentioned aims.

We invite teachers, societies, academics, industry alike to submit research articles for this special edition.

3. Submission Guidelines

Manuscripts for this special issue will be limited to a maximum of 6000 words of body text and authors are encouraged to aim for 4000-5000 words of body text (not counting abstract, tables and graphs, references, appendices). Note particularly that manuscripts can be written in Spanish, French or English; those in Spanish or French will be published with an English summary of around 1000 words (see the papers by Mayén et al. in vol. 8, no. 2, and by Bihan-Poudec in vol. 9, no. 2).

Manuscripts should be submitted in accordance with SERJ's standard Author Guidelines and using the Template file found on the Journal website: <http://iaseweb.org/Publications.php?p=SERJ>. The general author guidelines for SERJ can be found at <http://iaseweb.org/documents/SERJdocs/authorguide.pdf>.

4. Deadlines and Contact Information

Interested authors should email a letter of intent as a Word document attachment by 15 December 2017, but preferably earlier, consisting of an abstract of up to 250 words describing key aspects of the paper. Please address the e-mail to both Peter Howley and Ayse Aysin Bilgin, two of the SERJ guest editors for this special issue via peter.howley@newcastle.edu.au and ayse.bilgin@mq.edu.au. Authors will be sent an acknowledgement of their letter within 3 days of submission, and can expect to receive a response from the editorial team by January 2018. Potential authors with informal queries regarding the suitability of a planned paper are also encouraged to contact any member of the team.

Full manuscripts must be submitted by 15 July 2018 at the latest, by email to both Peter Howley and Ayse Aysin Bilgin in accordance with the submission guidelines listed earlier. Again, authors will be sent an acknowledgement of the manuscript's receipt within 3 days of its submission.

Decisions about the suitability of proposed papers and the allocation of accepted papers to the special issue (or alternatively to a regular SERJ issue) will be made jointly by the guest editors and the SERJ editors.

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