



Topic Study Group 1.7: Teaching and learning of statistics

Strand A

Team details

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Overview

We can, nay MUST, do better!

Statistics and data are ubiquitous in the knowledge society and consequently statistical literacy is an increasingly important capability at all levels to prepare citizens appropriately.

It has been over 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. As Tukey famously observed decades before, statisticians "get to play in everyone's backyard". It is this diversity and boundless potential to contribute and collaborate in and across all fields, coupled with the associated critical thinking,





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creativity and empowerment the profession engenders which provides many a statistician a sense of infinite opportunity and fulfilment.

One of the more striking aspects however, is the gap between this reality and the perception of statistics held by school students who are devoid of statistical thinking and exposed to the more descriptive numerical nature, and mathematical undertones, of statistics. The more broadly appealing practical, investigative, creative, and collaborative aspects of statistics, and the value of the field, are often lost; superseded by mathematical and statistical anxiety or apathy, resulting in a path that neither fulfils the growing demand and undersupply of statisticians, nor adequately prepares citizens more generally for this Data Age.

The need for valued and appropriate statistical learning and thinking continues to be prevalent as the world progresses to the emerging Industry 5.0 thinking which highlights research and innovation as drivers for a transition to a sustainable, human-centric and resilient society and industry. Statistical thinking, methods and skills are core to such research and innovation.

School curricula globally have introduced an earlier and/or increased focus on statistics as part of responding to the recognised value of statistics and statistical thinking. So, are we moving in the right direction, are we doing so quickly enough, or do we need a step-change or broader rethink in our approach to the teaching and learning of statistics? How do we mitigate the risk of continuing to highlight such concerns?

The aim of TSG 1.7 is to consider conditions and constraints of teaching and learning statistics and statistical thinking, from primary school to university, and to discuss how to improve such to reflect the needs of society and the future workforce.

Areas of interest

Further to the aim noted within Topic Overview, we are interested in theoretical, empirical, or design-based research, and other practical contributions, which may address one or more of the following themes, or other aspects of this topic description:

- What are the minimum and desired learning outcomes to fulfil societal and future workforce needs: from descriptive statistics and statistical literacy through to statistical inference and the role of a professional statistician in this Data Age?
- Citizens' statistical literacy: How may we develop such and promote appropriate use of statistics, statistical thinking and statistical tools?





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- What are the impediments or barriers to engaging students, and society, with statistics and 'statistical thinking' and fulfilling societal and future workforce needs, and how may such be mitigated?
- Should, or could, development of statistical thinking precede, follow or accompany the learning of statistical tools?
- How are school and higher education curricula reforms contributing to adequately advancing the teaching and learning of statistics? What kind of mathematical knowledge and competencies are needed for teaching statistics? How do approaches compare internationally and should engagement with the field of statistics precede, follow or accompany the learning of mathematics?

Example considerations:

- Research suggests students establish their career interests and trajectories early in life (some by 10 years of age). Do they obtain adequate and appropriate exposure to statistics by this time?
- We have an innate sense of variation when young (we know things vary). Does the early mathematical focus and its deterministic nature assist or complicate the teaching and learning process of statistical thinking and the stochastic nature of statistics?
- Strategies to support teachers' professional development and statistical competencies: task-design, teaching techniques and teacher knowledge; does undergraduate teacher training adequately enable educators to teach statistics; what support systems may be required?
- Characteristics, nature and development of statistical thinking and its relationship with probability and data science – do these disciplines complement one another and/or assist or confuse the learning of statistics?
- Use and impact of technology to support statistics teaching and learning.
- Assessment practices for statistical competencies.
- How may we address these seemingly perennial concerns about the teaching and learning of statistics and the perception of, and interest in, statistics? What is the nature of successful initiatives and research and how may we leverage such?

How to make a submission to this Topic Study Group

Submissions for Topic Study Group Papers and proposals for Posters open 28 April 2023 via the official ICME-15 website, icme15.org. The website also contains a timeline of dates for the activity of the Topic Study Groups in the lead up to the Congress.





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For questions about this TSG, please contact the Co-Chairs using the email addresses provided.

