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Preface to the Special Edition: The 2012 IASE Roundtable on Technology and Statistics Education

This volume of Technology Innovations in Statistics Education presents specially reviewed and edited papers based on presentations at the 2012 IASE Roundtable on Technology and Statistics Education in Cebu City, The Philippines. Statistics has a special relationship with technology, in that it impacts student learning of both concepts and procedures, perhaps in very different ways. Not only do instructors use technology to teach for conceptual understanding, but students must learn to use technology to perform statistics. When technology changes, statistics also changes. For example, Nicholson, Ridway, and McCuster show us, in two papers, how the growing complexity of data structures and data storage creates new challenges, but fortunately also provides new opportunities for both instructors and learners.

Some papers in this edition point to exciting opportunities for using technology to create new immersive learning experiences for students, such as the *Island* (Baglin, Bedford and Bulmer), or computer Data Games (Finzer; Erickson). Other papers report on how technologies are being used by instructors to improve instruction. Budgett, Pfannkuck, Regan, and Wild show how new dynamic visualizations aid students in learning fundamental concepts behind statistical inference. Mocko describes the decision-making process when choosing components required to create a successful on-line course. Krishnan and Idris explain the challenges and advantages of teaching with graphics calculators.

As we mentioned, statistics education has an interesting relationship with technology in that changes of technology change the practice of statistics, and so educators must adapt the curriculum to technology innovations. Calls for statistics education reform tell us to integrate technology into our teaching practice, but we must also teach students to use technology. Baglin describes how we might determine the best methods for teaching students to use statistical software. Hassad reminds us that teachers' attitudes towards technology are important in determining whether they can adapt to statistics education reform, and presents a scale for measuring attitudes towards technology. Increasing the use of technology is not simple, and Reston provides us with a theoretical framework for understanding how to evaluate the effects of integrating technology into the statistics classroom.

The IASE Roundtable included researchers from ten countries, and these countries represented a wide range of economic development. The cost of technology creates inequalities in how statistics reform can be implemented, but an interesting discovery of this Roundtable was that there are many universal challenges, and solutions to these challenges can cross international boundaries. As internet connections become more prevalent, innovative technologies can be more easily shared. This theme of international universality is present in several of the papers, but in particular, Stern, Coe, Stern & McDermott, and Stern focus on statistics education programs in Kenya, and point out that the problems they address are not unique to developing countries.

A popular hit by singer Shirley Bassey in the 1990s mentioned that "its all just a matter of history repeating." The 2012 Roundtable is perhaps repeated history: the 1996 IASE Roundtable also focused on the role of technology in statistics was titled "The Role of Technology." In her preface to the conference proceedings, Roundtable convener, Joan Garfield, noted four main themes that

emerged from that conference: the need for information on existing software, the changing role of the classroom teacher, the need for good assessment instruments, and directions for future research. Not surprisingly, some of the same themes emerged in 2012. For example, included in the need for information on existing software, Garfield noted that information should be available so that instructors and researchers do not have to “reinvent the wheel.” Some of the papers in this volume are exemplars of the type of sharing that can be done, such as the *Island* (Baglin, Bedford and Bulmer) and Mocko’s paper containing guidelines for technology use in online courses. Krishnan and Idris’ paper on graphics calculators reminds us that while some technologies have been used for years in one country or region, they may be new to others.

The conference attendees saw this repetition of technology implementation as an opportunity for collaboration between countries with a high level of technology infrastructure and countries in which some technologies are newly emerging. (Indeed, as was noted at the 2012 Roundtable, the same staggered technology implementation happens even within high-technology countries, where we see a great diversity in the quality and frequency of technology in the school systems.) A key difference between now and 1996 that will facilitate international collaborations is the development of internet-based communications, which allow researchers and instructors from very different geographic locations to collaborate more easily.

The 2012 conference presenters also address the 1996 theme of the changing role of the classroom teacher, albeit in different ways. Garfield noted in 1996 that information is needed to determine the best ways to integrate technology in classroom settings and to prepare teachers to do so. In 2012, Baglin and Reston both provide theoretical frameworks for making pedagogical decisions about the integration technology in statistics courses: Baglin from the perspective of teaching students to use statistical software and Reston from the perspective of teaching statistics more broadly. Hassad provides us with information about statistics instructors’ attitudes toward technology integration, adding to the body of literature on needs in the arena of teacher preparation. Finally, Mocko provides a blueprint instructors can follow to prepare themselves to teach statistics in the online environment. Finzer and Erickson, and the *Island* authors remind us that teachers now have a wider array of exciting teaching tools than ever before.

As was done in 1996, the participants at the 2012 Roundtable identified research priorities in the area of technology in statistics education. The three main research priorities were:

1. Evaluating the effectiveness of pedagogical strategies related to the implementation of technology on student learning and/or attitudes toward statistics
2. Evaluating models of professional development that support teachers' incorporation of technology in the classroom
3. Designing reliable and valid assessment items and measures that take into account changes in technology.

One caveat associated with the proposed research agenda is that there is a possibility that changes in technology and associated changes in the domain of statistics will lead to changes in necessary competencies and student outcomes and, therefore, curriculum.

The group noted that research designs should facilitate evidence-based teaching, be scientifically appropriate, and include a variety of methodologies: quantitative, qualitative, and mixed methods. Finally, the participants encourage the statistics education research community to provide opportunities to facilitate collaborations that will give support, authority, and acceptability to generated research findings. This should include collaborations, such as the Roundtable, that facilitate discussion ion between both researchers and instructors in statistics education.

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- Robert Gould (Univeristy of California, Los Angeles) and Jennifer Kaplan (University of Georgia), editors.