# Teaching Bits: Statistics Education Articles from 2010

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We located 36 articles that have been published from January 2010 through September 2010 that pertained to statistics education. In this column, we highlight a few of these articles that represent a variety of different journals that include statistics education in their focus. We also provide information about the journal and a link to their website so that abstracts of additional articles may be accessed and viewed.

## From *The American Statistician*

*http://pubs.amstat.org/*
*The American Statistician* contains articles related to statistics education that are organized into the following sections: Statistical Practice, Teacher's Corner, Reviews of Books and Teaching Materials. It is published quarterly and is available by paid subscription.

### "Who Is Teaching Introductory Statistics?"

By Frank P. Soler.
Volume  64, number 1  (2010)
http://pubs.amstat.org/doi/pdf/10.1198/tast.2010.09183
*Abstract:* The growing popularity of the statistical sciences has brought about an unprecedented student demand for undergraduate statistics courses, especially courses of an introductory nature. The question of "Who Is Teaching Introductory Statistics?" is at the core of whether over the next 50 years the discipline of statistics would be desired or feared. This commentary addresses compelling issues currently facing the status of statistics education in this nation.

## "Resequencing Topics in an Introductory Applied Statistics Course"

By Christopher J. Malone, John Gabrosek, Phyllis Curtiss & Matt Race.
Volume 64, number 1 (2010)
http://pubs.amstat.org/doi/abs/10.1198/tast.2009.08090
*Abstract:* The introductory applied statistics course taken by many thousands of undergraduate students has undergone a transformation over the past 25 years. Changes in what we teach, how we teach, and how we assess have impacted introductory statistics courses at institutions worldwide. In this article we shift focus from what we teach and how we teach to when we teach. We propose changes to the sequence in which core statistical concepts are presented in an introductory applied statistics course. The proposed ordering of topics repeats the sequence of descriptive summaries—probability theory—statistical inference several times throughout the course in various contexts.

## "Passion-Driven Statistics"

By Robert G. Easterling.
Volume 64, number 1 (2010)
http://pubs.amstat.org/doi/pdf/10.1198/tast.2010.09180
*Abstract:* As Meng (2009) made clear, one of the statistics profession's responsibilities is to be "the first quantitative trainers of future generations of scientists, engineers, policy makers, etc." (not just statisticians). Evidence suggests we have not met this challenge. In fact, our traditional Stat101 courses and texts can poison the statistical well for the people who become our potential sponsors and collaborators. We need to do more than teach 'methods.' We need to show from the first day and throughout the Stat101 experience that our methods exist to help people learn interesting things about issues and topics they are passionate about. This message pertains to the rising generations of professionals and the citizenry at large and it applies to statisticians. Getting the message across may require radically redesigned 'service courses' and a new generation of uber-teachers as Meng (2009) advocated. In the meantime we should use existing materials in ways that show how subject-matter passion can motivate statistical analyses that reveal interesting and important subject-matter insights. As we develop new texts and other materials we need better quality control by authors, editors, and reviewers to assure that our teaching supports our "first quantitative trainer" responsibility.

## From *Teaching Statistics*

http://www.rsscse.org.uk/ts/
An International Journal for Teachers that first appeared in 1979 and has been published three times a year ever since. It is available by paid subscription.

## "Mad Libs Statistics: A 'Happy' Activity"

By David Trumpower
Volume 32, number 1 (2010)
http://www3.interscience.wiley.com/journal/123238045/abstract

*Abstract:* This article describes a fun activity that can be used to help students make links between statistical analyses and their real-world implications. Although an illustrative example is provided using analysis of variance, the activity may be adapted for use with other statistical techniques.

## "Analysing the World Population: Using Population Pyramids and If the World Were a Village"

By Joanne Caniglia, Barbara Leapard
Volume 32, number 2 (2010)
http://www3.interscience.wiley.com/journal/123342801/abstract
*Abstract:* The book If the World Were a Village, by David J. Smith, is the context for analyzing and creating graphs of the world's demographic information. Students examine numerical information regarding the more than six billion world inhabitants by imagining the world's population as 100 people.

## "Using Resampling to Compare Two Proportions"

By W. Robert Stephenson, Amy G. Froelich & William M. Duckworth
Volume 32, number 3 (2010)
http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9639.2009.00379.x/abstract
*Abstract:* This article shows that when applying resampling methods to the problem of comparing two proportions, students can discover that whether you resample with or without replacement can make a big difference.

## "Teaching Prospect Theory with the Deal or No Deal Game Show"

By Ardith Baker, Teresa Bittner, Christos Makrigeorgis, Gloria Johnson & Joseph Haefner
Volume 32, number 3 (2010)
http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9639.2009.00390.x/abstract
*Abstract:* Recent evidence indicates that decision makers are more sensitive to potential losses than gains. Loss aversion psychology has led behavioral economists to look beyond expected utility by developing prospect theory. We demonstrate this theory using the Deal or No Deal game show.

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## From *Statistics Education Research Journal*

http://www.stat.auckland.ac.nz/~iase/publications.php?show=serj#archives/
SERJ is a peer-reviewed electronic journal of the International Association for Statistics Education (IASE) and the International Statistical Institute (ISI). SERJ is published twice a year and is free.

**"The Challenge of Preparing Preservice Teachers to Teach Informal Inferential Reasoning"**

By Aisling M. Leavy
Volume 9, number 1 (2010)
http://www.stat.auckland.ac.nz/~iase/serj/SERJ9(1)_Leavy.pdf
*Abstract:* There is growing recognition of the importance of developing young students' informal inferential reasoning (IIR). This focus on informal inference in school statistics has implications for teacher education. This study reports on 26 preservice teachers utilizing Lesson Study to support a focus on the teaching of IIR in primary classrooms. Participants demonstrated proficiency reasoning about the elements fundamental to informal inferential reasoning but had difficulties developing pedagogical contexts to advance primary students' informal inferential reasoning. Specifically, issues emerged relating to data type, an excessive focus on procedures, locating opportunities for IIR, and a lack of justification and evidence-based reading. Focusing on the lesson as the unit of analysis combined with classroom-based inquiry supported the development of statistical and pedagogical knowledge.

**"Making Comparisons Between Observed Data and Expected Outcomes: Students' Informal Hypothesis Testing with Probability Simulation Tools"**

By Hollylynne Stohl Lee, Robin L. Angotti & James E. Tarr
Volume 9, number  1 (2010)
http://www.stat.auckland.ac.nz/~iase/serj/SERJ9(1)_Lee.pdf
*Abstract:* We examined how middle school students reason about results from a computer-simulated die-tossing experiment, including various representations of data, to support or refute an assumption that the outcomes on a die are equiprobable. We used students' actions with the software and their social interactions to infer their expectations and whether or not they believed their empirical data could be used to refute an assumption of equiprobable outcomes. Comparisons across students illuminate intricacies in their reasoning as they collect and analyze data from the die tosses. Overall, our research contributes to understanding how students can engage in informal hypothesis testing and use data from simulations to make inferences about a probability distribution.

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## From *International Statistical Review*

http://isi.cbs.nl/isr.htm
ISR is the journal of the International Statistical Institute.  It provides a comprehensive view of work in statistics, over the whole spectrum of the statistical profession. It is published three times a year and is available by paid subscription.

**"Statistics and the Modern Student"**

By Robert Gould
Volume 78, number 2 (2010)
http://onlinelibrary.wiley.com/doi/10.1111/j.1751-5823.2010.00117.x/abstract

*Abstract:* The introductory statistics course has traditionally targeted consumers of statistics with the intent of producing a citizenry capable of a critical analysis of basic published statistics. More recently, statistics educators have attempted to centre the intro course on real data, in part to motivate students and in part to create a more relevant course. The success of this approach is predicated on providing data that the students see as real and relevant. Modern students, however, have a different view of data than did students of 10 or even 5 years ago. Modern statistics courses must adjust to the fact that students' first exposure to data occurs outside the academy.

## "On Becoming a Statistician—A Qualitative View"

*Abstract:* In this paper, we highlight some qualitative facets of the discipline of statistics and argue that a qualitative approach, in particular a qualitative methodology known as phenomenography, allows us to research important aspects of statistics pedagogy. We summarize several components of our recent research into students' conceptions of statistics, their learning of statistics, our teaching of statistics, and their perceptions of their future professional work. We have obtained this information on the basis of analyses of several series of interviews with students studying statistics, both as statistics majors and as service students. In each of these cases, the broadest views relate in some way to personal connection, growth, and change. In other words, they contain a strong ontological component—focusing on being or becoming a statistician—above and beyond the standard epistemological component—focusing on the knowledge required to do statistics. We discuss the importance of personal change in becoming a statistician, or an informed professional user of statistics, and investigate the pedagogical conditions under which such change is likely to occur.

## From *International Electronic Journal of Mathematics Education*
*http://www.iejme.com/index.htm*
(IEJME) is an academic journal that publishes articles concerning research ideas and methods in the field of mathematics education. It is published three times a year and is free.

## "Teachers' Construction of Learning Environments for Conditional Probability and Independence"

*Abstract:* Although literature on challenges to students' learning of data analysis and probability has steadily accumulated over the past few decades, research on challenges encountered in teaching the content area is in its beginning stages. The present study aims to help build this area of research by identifying some knowledge elements necessary for teaching conditional probability and independence. Artifacts of classroom practice, including written plans and lesson video, were used to identify challenges encountered by teachers in establishing productive

learning environments for students first learning the concepts. It is proposed that enhanced common and specialized content knowledge may help teachers address the challenges identified. Some salient aspects include knowledge of: distinctions among major concepts, data displays with pedagogical value, and the roles of fractions and combinatorial ideas in the psychology of learning conditional probability and independence. The discussion of these and other relevant knowledge aspects is drawn upon to propose potentially productive directions for teacher education efforts and future research.

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