Teaching Bits: Statistics Education Articles from 2009

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www.amstat.org/publications/jse/v17n3/garfieldTB.html

We located 61 articles that have been published from January till November 2009 that pertain 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 *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.

"Creating Realistic Data Sets with Specified Properties via Simulation"

By Robert N. Goldman, John D. McKenzie Jr.
Volume 31, Number 1 (2009)
http://www3.interscience.wiley.com/cgi-bin/fulltext/121620302/PDFSTART
Abstract: We explain how to simulate both univariate and bivariate raw data sets having specified values for common summary statistics. The first example illustrates how to 'construct' a data set having prescribed values for the mean and the standard deviation – for a one-sample t test with a specified outcome. The second shows how to create a bivariate data set with a specified correlation coefficient.

"A Straight Look at Skew Distributions"

By Michael Bedwell
Volume 31, Number 1 (2009)
http://www3.interscience.wiley.com/cgi-bin/fulltext/121620299/PDFSTART

Abstract: This article argues that the Normal distribution is often not a good model for anthropomorphic data.

"Experimental Probability in Elementary School"

By Andrew Lane
Volume 31, Number 2 (2009)
http://www3.interscience.wiley.com/journal/122324633/abstract
Abstract: Concepts in probability can be more readily understood if students are first exposed to probability via experiment. Performing probability experiments encourages students to develop understandings of probability grounded in real events, as opposed to merely computing answers based on formulae.

"Knowing Your Limitations"

By Colin Foster
Volume 31, Number 2 (2009)
http://www3.interscience.wiley.com/journal/122324630/abstract
Abstract: This article reflects on whether probability statements can usefully be made about one-off exceptional events.

"An Inside Look at the Two Envelopes Paradox"

By Ruma Falk 1 and Raymond S. Nickerson
Volume 31, Number 2 (2009)
http://www3.interscience.wiley.com/journal/122324625/abstract
Abstract: When two sealed envelopes contain money, one twice as much as the other, a player should be indifferent between them. But when one envelope is opened, one's decision should vary as a function of the observed value and one's subjective probabilities.

"Helping Students Develop Statistical Reasoning: Implementing a Statistical Reasoning Learning Environment"

By Joan Garfield and Dani Ben-Zvi
Volume 31, Number 3 (2009)
http://www3.interscience.wiley.com/journal/122544452/abstract
Abstract: This article describes a model for an interactive, introductory secondary- or tertiary-level statistics course that is designed to develop students' statistical reasoning. This model is called a 'Statistical Reasoning Learning Environment' and is built on the constructivist theory of learning.

"Improbable versus Unexpected Outcomes"

By Paul J. van Staden
Volume 31, Number 3 (2009)
http://www3.interscience.wiley.com/journal/122544462/abstract
Abstract: In this short note, the difference between improbable and unexpected outcomes is demonstrated via an example that uses the hypergeometric distribution.

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 Influence of Variation and Expectation on the Developing Awareness of Distribution"

By Jane M. Watson
Volume 8, Number 1 (2009)
http://www.stat.auckland.ac.nz/~iase/publications.php?show=serjarchive
Abstract: This study considers the evolving influence of variation and expectation on the development of school students' appreciation of distribution as displayed in their construction of graphical representations of data sets. Three interview protocols are employed, presenting different contexts within which 109 students, ranging in age from 6 to 15 years, could display and interpret their understanding. Responses are analyzed within a hierarchical cognitive framework. It is hypothesized from the analysis that, contrary to the order in which expectation and variation are introduced in the school curriculum, the natural tendency for students is to acknowledge variation first and then expectation.

From *Mathematics Teacher*

http://www.nctm.org/publications/mt.aspx
MT is an official journal of the National Council of Teachers of Mathematics. It is published nine times a year.

"How Sample Size Affects a Sampling Distribution"

By Madhuri S. Mulekar and Murray H. Siegel
Volume 103, Number 1 (2009)
http://www.nctm.org/eresources/article_summary.asp?URI=MT2009-08-34a&from=B
Abstract: The writers describe how combining simulations with a discovery approach offers students a way to discover the concepts associated with sampling distributions. They outline one such approach that used statistical software and another that used a graphing calculator.

"Empowering Students through Data"

By Paige A. Barnes
Volume 102, Number 8 (2009)
http://www.nctm.org/eresources/article_summary.asp?URI=MT2009-04-614a&from=B
Abstract: This article describes an activity that helps students understand data analysis concepts while learning how to take control of their learning.

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.

"Does Your iPod Really Play Favorites?"

By Amy G. Froelich, William M. Duckworth, and Jessica Culhane
Volume 63, Number 3
http://pubs.amstat.org/doi/abs/10.1198/tast.2009.07073
Abstract: Since the introduction of the first iPod portable music player (MP3 player) by Apple, Inc., users have questioned the randomness of the shuffle feature. Most evidence cited by users claiming to show nonrandom behavior in the shuffle feature is anecdotal in nature and not based on any systematic analysis of its randomness. This article reports on our attempt to investigate the shuffle feature on the iPod and to test its randomness through the use of probability and statistical modeling. We begin by reviewing the research on people's inability to perceive and understand both random and nonrandom behavior. Probability models are then developed, under the assumption of a random shuffle, for several of the most common types of events cited as evidence of a nonrandom shuffle. Under this null hypothesis of a random shuffle, several goodness-of-fit tests of one of the probability models are conducted using data collected from real iPods. No evidence to support user claims of a nonrandom shuffle was found. Finally, we conclude with some reflections on and ideas for incorporating these examples into undergraduate probability and statistics courses.

"Managing Case Discussions in Introductory Business Statistics Classes: Practical Approaches for Instructors"

By Marlene A. Smith and Peter G. Bryant
Volume 63, Number 4
http://pubs.amstat.org/doi/abs/10.1198/tast.2009.09053
Abstract:Case discussions have become an integral component of our business statistics courses. We have discovered that case discussion adds enormous benefits to the classroom and learning experience of our students even in a quantitatively based course like statistics. As we read about discussion-based methods, we discovered that the literature is mostly silent about the specific challenges of case teaching in statistics courses. This article is an attempt to fill that void. It provides a "how-to" starter's guide for those interested in incorporating case discussions in statistics courses. It includes resources for background reading, tips on setting up a statistics case discussion course, and examples of four specific case discussions involving statistics topics. An illustrative case and instructor's notes that can be used on the first day of class are provided as well. Because we have had mixed reactions to conducting case discussions online, we believe that the use of case discussion in distance education statistics courses is a fruitful area for experimentation and research. Although our experience is in the business statistics classroom, this article is also applicable to statistics courses in other disciplines.

From *Teaching and Teacher Education: an International Journal of Research and Studies*

http://www.sciencedirect.com/science/journal/0742051X
Teaching and teachers education is an international journal about theory, research, and practice in teaching and teacher education. It publishes six to eight issues a year.

"Characteristics of teachers' conversations about teaching mean, median, and mode"

By Randall E. Groth
Volume 25, Number 5
Abstract: The study analyzed a conversation among a group of teachers responsible for teaching the concepts of mean, median, and mode. After reading an article describing some specific student difficulties in learning the concepts, teachers were asked to discuss how the teaching of the concepts could be improved. Several claims pertinent to improving teaching practice were offered. Claims focused on the appropriate age at which to introduce statistical concepts, the influence of the state-prescribed curriculum on teaching practice, content-specific teaching strategies, and content-independent teaching strategies. Teachers' claims were discussed in terms of points of departure and agreement with existing empirical research.

From *School Science and Mathematics*

http://ssmj.tamu.edu/
The SSM is an international journal that emphasizes on research on issues, concerns, and lessons within and between the disciplines of science and mathematics in the classroom. The journal is published monthly, October through May. It is free.

"Connecting Science and Mathematics: Using Inquiry Investigations to Learn About Data Collection, Analysis, and Display"

By Neporcha Cone
Volume 109, Number 1
http://ssmj.tamu.edu/abstract/abstract_january_2009.php#article_3
Abstract: The purpose of this study was to explore the effect of providing preservice teachers the opportunity to collect real data in a science methods inquiry investigation and using the data, design data displays in their mathematics methods course. The research questions focused on how preservice teachers' understandings of data displays, research design, and the specific content addressed improved when they used these displays to attempt to communicate the data they had collected themselves in their inquiry investigations. The 46 preservice teachers were given questionnaires at the beginning and end of the courses, twelve were interviewed both pre and post, all written work pertaining to data displays and the inquiry investigations was collected, methods class sessions were audio and videotaped, and the final data display and science investigation projects were photocopied. The findings show that by creating and scrutinizing their data displays, the preservice teachers were able to recognize the limitations of their inquiry investigation design. Through working with data in the context of inquiry projects of their own design, the preservice teachers realized meaningful connections and commonalities that exist in mathematics and science while strengthening their knowledge and skills in both disciplines.