



Teaching Bits: Statistics Education Articles from 2014

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I located 15 articles and one set of conference proceedings that have been published from July through October 2014 that pertained to statistics education. In this column, I highlight a few of these articles that represent a variety of different journals that include statistics education in their focus. I also provide information about the journals and book and a link to their websites so that abstracts of additional articles may be accessed and viewed.

From the *International Conference on Teaching Statistics* (ICOTS-9)

The ninth International Conference on Teaching Statistics (ICOTS-9) was held from July 13-18, 2014 in Flagstaff, Arizona. The conference proceedings include over 330 papers by authors from 48 countries and encompass a variety of topics related to teaching statistics and carrying out statistics education research. The proceedings were edited by Katie Makar, Bruno de Sousa, and Robert Gould and published by the International Association for Statistical Education (IASE) and the International Statistical Institute (ISI). <http://icots.info/9/proceedings/home.html>

From *Teaching Statistics*

<http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291467-9639>

Teaching Statistics is 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.

“Developing Consistency in the Terminology and Display of Bar Graphs and Histograms”

By Patricia B. Humphrey, Sharon Taylor, and Kathleen Cage Mittag

Volume 36, Number 3 (2014)

<http://onlinelibrary.wiley.com/doi/10.1111/test.12030/full>

Abstract: Students often are confused about the differences between bar graphs and histograms. The authors discuss some reasons behind this confusion and offer suggestions that help clarify thinking.

“Using playing cards to differentiate probability interpretations”

By Jorge López Puga

Volume 36, Number 3 (2014)

<http://onlinelibrary.wiley.com/doi/10.1111/test.12055/full>

Abstract: The aprioristic (classical, naïve and symmetric) and frequentist interpretations of probability are commonly known. Bayesian or subjective interpretation of probability is receiving increasing attention. This paper describes an activity to help students differentiate between the three types of probability interpretations.

“A Hands-on Activity for Teaching the Poisson Distribution Using the Stock Market”

By Mickey Dunlap and Sharyn Studdstill

Volume 36, Number 3 (2014)

<http://onlinelibrary.wiley.com/doi/10.1111/test.12028/full>

Abstract: The number of increases a particular stock makes over a fixed period follows a Poisson distribution. This article discusses using this easily-found data as an opportunity to let students become involved in the data collection and analysis process.

“Measuring the variability of data from other values in the set”

By Dustin L. Jones and Stephen M. Scariano

Volume 36, Number 3 (2014)

<http://onlinelibrary.wiley.com/doi/10.1111/test.12056/full>

Abstract: Students have intuitive notions of the meaning of variability; some may see variability as how values in a set vary from each other. This article provides a measure of variability that is based on that conception. We introduce this new measure and a method for calculating it. Finally, we prove that this measure is equivalent to the population variance.

From *Technology Innovations in Statistics Education*

<http://repositories.cdlib.org/uclastat/cts/tise/>

TISE reports on studies of the use of technology to improve statistics learning at all levels, from kindergarten to graduate school and professional development. It is a free, online journal.

“Using Lexical Analysis Software to Assess Student Writing in Statistics”

By Jennifer J. Kaplan, Kevin C. Haudek, Minsu Ha, Neal Rogness, and Diane G. Fisher
Volume 8, Number 1 (2014)

<http://escholarship.org/uc/item/57r90703#>

Abstract: Meaningful assessments that reveal student thinking are vital to the success of addressing the GAISE recommendation: use assessments to improve and evaluate student learning. Constructed-response questions, also known as open-response or short answer questions, in which students must write an answer in their own words, have been shown to better reveal students' understanding than multiple-choice questions, but they are much more time consuming to grade for classroom use or code for research purposes. This paper describes and illustrates the use of two different software packages to analyze open-response data collected from undergraduate students' writing. The analysis and results produced by the two packages are contrasted with each other and with the results obtained from hand coding of the same data sets. The article concludes with a discussion of the advantages and limitations of the analysis options for statistics education research.

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 and is available by paid subscription.

“Who’s in the Lead?”

By Alfinio Flores
Volume 108, number 1 (2014)

<http://www.nctm.org/publications/article.aspx?id=42696>

Abstract: The striking results of this coin-tossing simulation help students understand the law of large numbers.

“Probability and Perception: The Representativeness Heuristic in Action”

By Yun Lu, Francis J. Vasko, Trevor J. Drummond, and Lisa E. Vasko
Volume 108, number 2 (2014)

<http://www.nctm.org/publications/article.aspx?id=43015>

Abstract: Events that seem more representative may be judged more probable, so experiments and proof are needed to help students analyze a mathematical outcome.

“Probability Explorations in a Multicultural Context”

By Nirmala Naresh, Suzanne R. Harper, Jane M. Keiser, and Norm Krumpe

Volume 108, number 3 (2014)

<http://www.nctm.org/publications/article.aspx?id=43185>

Abstract: The early Hawaiian game of LuLu can be used to discuss both experimental and theoretical probability.

From *Mathematical Thinking and Learning*

<http://www.tandfonline.com/toc/hmtl20/current#.U8xCY7GTHoE>

Mathematical Thinking and Learning is a journal directed at researchers in mathematics education, with a focus on mathematical thinking, reasoning and learning. It is published quarterly.

“Two-Way Tables: Issues at the Heart of Statistics and Probability for Students and Teachers.”

By Jane Watson and Rosemary Callingham

Volume 16, number 4 (2014)

<http://www.tandfonline.com/doi/full/10.1080/10986065.2014.953019#.VGgUWs15XoE>

Abstract: Some problems exist at the intersection of statistics and probability, creating a dilemma in relation to the best approach to assist student understanding. Such is the case with problems presented in two-way tables representing conditional information. The difficulty can be confounded if the context within which the problem is set is one where students have preconceived opinions on the direction of the potential association present. This article considers school students’ responses to two problems of association, with data presented in 2×2 tables. A hierarchical rubric is presented to document students’ understandings. Teachers’ pedagogical content knowledge is also considered in relation to the same two problems. Findings include a surprising relationship of outcomes for students across the problem contexts and some concern about teachers’ pedagogical content knowledge in this area of the curriculum.

From *Educational Studies in Mathematics*

<http://www.springer.com/education+%26+language/mathematics+education/journal/10649>

ESM is an international journal that focuses on presenting new ideas and developments of major importance to those working in the field of mathematical education. ESM is published eight to nine times a year.

“On Understanding Variability in Data: a Study of Graph Interpretation in an Advanced Experimental Biology Laboratory”

By Wolff-Michael Roth and Shelby Temple

Volume 86, number 3 (2014)

<http://link.springer.com/article/10.1007/s10649-014-9535-5>

Abstract: Data analysis is constitutive of the discovery sciences. Few studies in mathematics education, however, investigate how people deal with (statistical) variability and statistical variance in the data to be interpreted. And even fewer, if any, focus on the uncertainties with which scientists wrestle before they are confident in the data they produce. The purpose of this study is to exhibit the work of coping with variability in one advanced research laboratory, as exemplified in a typical data analysis session. The study shows that when the scientists are confronted with novel data, their understanding of the variability does not arise in straightforward fashion, and a lot of normally invisible (interactional) work is required to constitute understanding. Tentative conclusions are provided for the implication to mathematics education.

From *Mathematics Teaching in the Middle School*

<http://www.nctm.org/publications/toc.aspx?jrnln=mtms>

MTMS is an official journal of the National Council of Teachers of Mathematics. It is published nine times a year and is available by paid subscription.

“Gone Fishing: Science, Proportions, and Probability”

By Jill A. Cochran

Volume 20, number 1 (2014)

<http://www.nctm.org/publications/article.aspx?id=42744>

Abstract: An outdoor context can reel in two important mathematical ideas and catch students' misconceptions in the process.

From *Teaching of Psychology*

Teaching of Psychology is a peer-reviewed academic journal about the teaching and learning of psychology at the high school, introductory college, or higher level. This journal is published quarterly and available by paid subscription.

“Debating Curricular Strategies for Teaching Statistics and Research Methods: What Does the Current Evidence Suggest?”

By Kenneth E. Barron and Kevin J. Apple

Volume 41, number 3 (2014)

<http://top.sagepub.com/content/41/3/187.abstract>

Abstract: Coursework in statistics and research methods is a core requirement in most undergraduate psychology programs. However, is there an optimal way to structure and sequence methodology courses to facilitate student learning? For example, should statistics be required

before research methods, should research methods be required before statistics, or should statistics and research methods be taught in a combined, integrated fashion? In this article, we first review the current empirical evidence on whether there is a preferred format and sequencing of methodology courses to enhance student learning outcomes. Then we summarize an assessment study conducted at our own institution comparing a *nonintegrated*, two-course sequence that required statistics before research methods and an *integrated*, two-course sequence in which students shifted in and out of research methods and statistics units during each semester on short-term and long-term student outcomes. Our results revealed that students enrolled in the integrated sequence not only earned higher course grades in each of their initial methodology courses but also scored higher on senior exit assessments of their methodology skills taken at the end of their undergraduate careers.

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