Teaching Bits: Statistics Education Articles from 2015

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Journal of Statistics Education Volume 23, Number 2 (2015),
www.amstat.org/publications/jse/v23n2/frytb.pdf

I located 14 total articles that have been published from March 15 through July 15, 2015 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 a link to their websites so that abstracts of additional articles may be accessed and viewed. In this issue I also highlight some recently completed dissertations in statistics education.

Statistics Education Dissertations from IASE website

http://iase-web.org/Publications.php?p=Dissertations

The International Association for Statistical Education (IASE) website features various publications including recent doctoral dissertations focused on statistics education. Below are three recently completed statistics education dissertations.

"Development and testing of an open learning environment to enhance statistics and mathematics education"
By Anna Helga Jónsdóttir, University of Iceland, 2015
Supervisor: Gunnar Stefánsson

"Bridging the Gap Between Tools for Learning and for Doing Statistics"
By Amelia Ahlers McNamara, University of California, Los Angeles, 2015
Supervisors: Robert Gould and Fredrick R Paik Schoenberg

"Reconceptualizing statistical literacy: Developing an assessment for the modern introductory statistics course"
By Laura Ziegler, University of Minnesota, 2014
Supervisors: Joan Garfield and Michelle Everson

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.

"Numbers defy the law of large numbers"

By Ruma Falk and Avital Lavie Lann
Volume 37, Number 2 (2015)
http://onlinelibrary.wiley.com/doi/10.1111/test.12031/abstract
Abstract: As the number of independent tosses of a fair coin grows, the rates of heads and tails tend to equality. This is misinterpreted by many students as being true also for the absolute numbers of the two outcomes, which, conversely, depart unboundedly from each other in the process. Eradicating that misconception, as by coin-tossing experiments, should be incorporated early on into learning the law of large numbers.

"Did the Gamemakers Fix the Lottery in the Hunger Games?"

By Kyle Caudle and Erica Daniels
Volume 37, Number 2 (2015)
http://onlinelibrary.wiley.com/doi/10.1111/test.12078/abstract
Abstract: The Hunger Games is an annual event in the fictional country of Panem. Each year, 24 children (tributes) are chosen by lottery from 12 districts to fight to the death in the arena for the entertainment of the Capitol citizens. Using statistical analysis and computer simulations, we will explore the possibility that the Gamemakers, those in charge of planning the Hunger Games, fixed the lottery. Using the fictitious data from Suzanne Collins' book the Hunger Games, we show how students can learn how to perform a permutation goodness of fit test.

"Motivating Inquiry in Statistics and Probability in the Primary Classroom"

By Aisling Leavy and Mairéad Hourigan
Volume 37, Number 2 (2015)
http://onlinelibrary.wiley.com/doi/10.1111/test.12062/abstract
Abstract: We describe how the use of a games environment combined with technology supports upper primary children in engaging with a concept traditionally considered too advanced for the primary classes: The Law of Large Numbers.

From *Statistics Education Research Journal*

http://iase-web.org/Publications.php?p=SERJ_issues
SERJ is a peer-reviewed electronic journal of the International Association for Statistics Education (IASE) and the International Statistical Institute (ISI). It is published twice a year. SERJ is a free online journal.

"Evaluating Two Models of Collaborative Tests in an Online Introductory Statistics Course"

By Auðbjörg Björnsdóttir, Joan Garfield, and Michelle Everson
Volume 14, Number 1 (2015)
http://iase-web.org/documents/SERJ/SERJ14%281%29_Bjornsdottir.pdf
Abstract: This study explored the use of two different types of collaborative tests in an online introductory statistics course. A study was designed and carried out to investigate three research questions: (1) What is the difference in students' learning between using consensus and non-consensus collaborative tests in the online environment?, (2) What is the effect of using consensus and non-consensus collaborative tests on students' attitudes towards statistics?, and (3) How does using a required consensus vs. a non-consensus approach on collaborative tests affect group discussions? Qualitative and quantitative methods were used for data analysis. While no significant difference was found between groups using the two collaborative testing formats, there was a noticeable increase in students' attitudes across both formats towards learning statistics. This supports prior research on the benefits of using collaborative tests in face-to-face courses.

"Using Guided Reinvention to Develop Teachers' Understanding of Hypothesis Testing Concepts"

By Jason Dolor and Jennifer Noll
Volume 14, Number 1 (2015)
http://iase-web.org/documents/SERJ/SERJ14%281%29_Dolor.pdf
Abstract: Statistics education reform efforts emphasize the importance of informal inference in the learning of statistics. Research suggests statistics teachers experience similar difficulties understanding statistical inference concepts as students and how teacher knowledge can impact student learning. This study investigates how teachers reinvented an informal hypothesis test for categorical data through the framework of guided reinvention. We describe how notions of variability help bridge the development from informal to formal understandings of empirical sampling distributions and procedures for constructing statistics and critical values for conducting hypothesis tests. A product of this paper is a hypothetical learning trajectory that statistics educators could utilize as both a framework for research and as an instructional tool to improve the teaching of hypothesis testing.

"Collaborative Professional Development for Statistics Teaching: A Case Study of Two Middle-School Mathematics Teachers"

By Leandro de Oliveira Souza, Celi Espasandin Lopes, and Maxine Pfannkuch
Volume 14, Number 1 (2015)
http://iase-web.org/documents/SERJ/SERJ14%281%29_Souza.pdf
Abstract: The recent introduction of statistics into the Brazilian curriculum has presented a multi-problematic situation for teacher professional development. Drawing on research in the areas of teacher development and statistical inquiry, we propose a Teacher Professional Development Cycle (TPDC) model. This paper focuses on two teachers who planned a lesson in collaboration with other teachers, implemented the lesson, and then reported on the implementation. Results indicate that the TPDC model has the potential to begin to upskill teachers with multi-dimensional development needs. TPDC provides an environment for helping teachers overcome their current beliefs and attitudes towards statistics and statistics teaching. The implications of our TPDC model for improving teachers' practice in statistics are discussed.

From *Mathematics Teacher*

http://www.nctm.org/publications/mathematics-teacher/
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.

"A Random Walk: Stumbling across Connections"

By Nicholas H. Wasserman
Volume 108, Number 9 (2015)
http://www.nctm.org/Publications/Mathematics-Teacher/2015/Vol108/Issue9/A-Random-Walk_-Stumbling-across-Connections/
Abstract: A random walk, also colloquially known as a drunkard's walk, was a term first introduced by Karl Pearson in 1905 (Pearson 1905). Random walks are paths that consist of a succession of random steps. Despite the seemingly unknown nature of events of chance, it is the random and recursive nature of these walks that permit more precise study and results to be obtained, drawing on probability computations. Although random walks perhaps unrealistically simplify real-life situations, they are particularly powerful because many real-world phenomena can be modeled sufficiently well by them—for example, a molecule bumping around as it travels through a gas, the price of a fluctuating stock, or a random person's path around city blocks.

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.
Volume 69, Issue 2 from June 2015 is a special section to celebrate the *American Statistical Association*'s 175th anniversary.

"Advanced Placement Statistics: Expanding the Scope of Statistics Education"

By Allan Rossman, Roy St. Laurent, and Josh Tabor
Volume 69, Number 2 (2015)
http://www.tandfonline.com/doi/full/10.1080/00031305.2015.1033985#abstract
Abstract: A list of consequential developments in the field of statistics for the past quarter-century must include the creation and implementation of the Advanced Placement (AP) program in Statistics. This program has introduced millions of high school students to our discipline over the past 18 years, contributing to the large increase in the number of undergraduate students pursuing statistics as their major in college. ASA members and leaders have played a substantial role in shaping this program and furthering its success.

"Challenges and Opportunities for Statistics and Statistical Education: Looking Back, Looking Forward"

By Nicholas J. Horton
Volume 69, Number 2 (2015)
http://www.tandfonline.com/doi/full/10.1080/00031305.2015.1032435
Abstract: The 175th anniversary of the ASA provides an opportunity to look back into the past and peer into the future. What led our forebears to found the association? What commonalities do we still see? What insights might we glean from their experiences and observations? I will use the anniversary as a chance to reflect on where we are now and where we are headed in terms of statistical education amidst the growth of data science. Statistics is the science of learning from data. By fostering more multivariable thinking, building data-related skills, and developing simulation-based problem solving, we can help to ensure that statisticians are fully engaged in data science and the analysis of the abundance of data now available to us.

"The Many Facets of Statistics Education: 175 Years of Common Themes"

By Jessica Utts
Volume 69, Number 2 (2015)
http://www.tandfonline.com/doi/full/10.1080/00031305.2015.1033981#abstract
Abstract: The American Statistical Association's primary founder, Lemuel Shattuck, was driven by a passion for collecting and disseminating accurate information on vital statistics, public health, and other statistically related concerns. The 175th anniversary provides an opportunity to reflect on the education-related reasons ASA was founded and what it has done in education since its founding, especially in the past 25 years since the 150th anniversary. An examination of early and more recent issues of the ASA's journals reveals some common themes that have recurred over the past 175 years. We discuss what those themes are and what the ASA is doing to address them currently, and then conclude by discussing what ASA members can do to help.

From *Teaching of Psychology*

http://top.sagepub.com/
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.

"Demonstrating the Effectiveness of an Integrated and Intensive Research Methods and Statistics Course Sequence"

By Rebecca M. Pliske, Tracy L. Caldwell, Robert J. Calin-Jageman, and Tina Taylor-Ritzler
Volume 42, Number 2 (2015)
http://top.sagepub.com/content/42/2/153.abstract
Abstract: We developed a two-semester series of intensive (six-contact hours per week) behavioral research methods courses with an integrated statistics curriculum. Our approach includes the use of team-based learning, authentic projects, and Excel and SPSS. We assessed the effectiveness of our approach by examining our students' content area scores on the area concentration achievement test (ACAT) for psychology students. On average, our students scored significantly higher on the ACAT experimental methods and statistics content areas than the national norm. This intensive approach to teaching behavioral research methods and statistics is effective.
