



Teaching Bits: Statistics Education Articles from 2014

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I located 15 articles that have been published from March through June 2014 that pertained to statistics education. In this column, I highlight a subset 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.

From *Teaching Statistics*

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

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.

“Using Online Surveys to Promote and Assess Learning”

By Laura Taylor and Kirsten Doehler
Volume 36, Number 2 (2014)

<http://onlinelibrary.wiley.com/doi/10.1111/test.12045/full>

Abstract: This article explores the use of online survey software to collect data from students during class to efficiently use class time. Several example activities for an introductory statistics classroom are considered. We also discuss utilization of online survey software for other purposes such as collecting assessment information and student preferences related to statistics projects.

“A Closer Look at the Notorious Birthday Coincidences”

By Ruma Falk
Volume 36, Number 2 (2014)

<http://onlinelibrary.wiley.com/doi/10.1111/test.12014/full>

Abstract: The article asks about the minimal number of persons required for achieving a probability $1/2$ that **a**. At least two share a birthday, **b**. At least one shares the reader's birthday. A basic question about the necessary number of checks underlies both problems.

“Regression Analysis and the Sociological Imagination”

By Fernando De Maio

Volume 36, Number 2 (2014)

<http://onlinelibrary.wiley.com/doi/10.1111/test.12019/full>

Abstract: Regression analysis is an important aspect of most introductory statistics courses in sociology but is often presented in contexts divorced from the central concerns that bring students into the discipline. Consequently, we present five lesson ideas that emerge from a regression analysis of income inequality and mortality in the USA and Canada.

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.

“R Markdown: Integrating a Reproducible Analysis Tool into Introductory Statistics”

By Ben Baumer, Mine Cetinyaka-Rundel, Andrew Bray, Linda Loi, and Nicholas J. Horton

Volume 8, Number 1 (2014)

<http://escholarship.org/uc/item/90b2f5xh#>

Abstract: Nolan and Temple Lang argue that “the ability to express statistical computations is an essential skill.” A key related capacity is the ability to conduct and present data analysis in a way that another person can understand and replicate. The copy-and-paste workflow that is an artifact of antiquated user-interface design makes reproducibility of statistical analysis more difficult, especially as data become increasingly complex and statistical methods become increasingly sophisticated. R Markdown is a new technology that makes creating fully-reproducible statistical analysis simple and painless. It provides a solution suitable not only for cutting edge research, but also for use in an introductory statistics course. We present experiential and statistical evidence that R Markdown can be used effectively in introductory statistics courses, and discuss its role in the rapidly-changing world of statistical computation.

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). It is published twice a year. SERJ is a free online journal.

“Exploiting Lexical Ambiguity to Help Students Understand the Meaning of *Random*”

By Jennifer J. Kaplan, Neal T. Rogness, and Diane G. Fisher

Volume 13, Number 1 (2014)

http://iase-web.org/documents/SERJ/SERJ13%281%29_Kaplan.pdf

Abstract: Words that are part of colloquial English but used differently in a technical domain may possess lexical ambiguity. The use of such words by instructors may inhibit student learning if incorrect connections are made by students between the technical and colloquial meanings. One fundamental word in statistics that has lexical ambiguity for students is “random.” A suggestion in the literature to counteract the effects of lexical ambiguity and help students learn vocabulary is to exploit the lexical ambiguity of the words. This paper describes a teaching experiment designed to exploit the lexical ambiguities of *random* in the statistics classroom and provides preliminary results that indicate that such classroom interventions can be successful at helping students make sense of ambiguous words.

“Teachers’ Use of Transnumeration in Solving Statistical Tests with Dynamic Statistical Software”

By Hollylynn S. Lee, Gladis Kersaint, Suzanne R. Harper, Shannon O. Driskell, Dusty L. Jones, Keith R. Leatham, Robin L. Angotti, and Kwaku Adu-Gyamfi

Volume 13, Number 1 (2014)

http://iase-web.org/documents/SERJ/SERJ13%281%29_Lee.pdf

Abstract: This study examined a random stratified sample (n=62) of teachers’ work across eight institutions on three tasks that utilized dynamic statistical software. We considered how teachers may utilize and develop their statistical knowledge and technological statistical knowledge when investigating a statistical task. We examined how teachers engaged in transnumerative activities with the aid of technology through representing data, using dynamic linking capabilities, and creating statistical measures and augmentations to graphs. Results indicate that while dynamic linking was not always evident in their work, many teachers took advantage of software tools to create enhanced representations through many transnumerative actions. The creation and use of such enhanced representations of data have implications for teacher education, software design, and focus for future studies.

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.

“Activities for Students: Measuring Biodiversity with Probability.”

By Sarah I. Duncan, Suzanne Lenhart, and Kelly K. Sturner

Volume 107, Number 7 (2014)

<http://www.nctm.org/publications/article.aspx?id=40660>

Abstract: Students learn how ecologists use probability to determine an area’s biodiversity.

From *Mathematical Thinking and Learning*

<http://www.tandfonline.com/toc/html20/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.

“Fifth Through Eighth Grade Students’ Difficulties in Constructing Bar Graphs: Data Organization, Data Aggregation, and Integration of a Second Variable.”

By Merce Garcia-Mila, Eduard Marti, Sandra Gilabert, and Marina Castells
Volume 16, Number 3 (2014)

<http://www.tandfonline.com/doi/abs/10.1080/10986065.2014.921132?queryID=%24{resultBean.queryID}#.U8xCU7GTHoE>

Abstract: Studies that consider the displays that students create to organize data are not common in the literature. This article compares fifth through eighth graders’ difficulties with the creation of bar graphs using either raw data (Study 1, $n = 155$) or a provided table (Study 2, $n = 152$). Data in Study 1 showed statistical differences for the type of data organization but not for grade level. Students’ primary problem was choosing a format that integrated a second variable and aggregating data. In contrast, in Study 2, we observed that seventh and eighth graders outperformed fifth and sixth graders. We interpret these results in terms of older students’ better data interpretation competence. We conclude that students’ difficulties in bar graphing can be traced to their tabulation processes. Data organization is essential for understanding and representing data, and educators should devote to it the attention it deserves.

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.

“Young Children’s Explorations of Average through Informal Inferential Reasoning”

By Katie Makar
Volume 86, Number 1 (2014)

<http://link.springer.com/article/10.1007/s10649-013-9526-y>

Abstract: This study situates children's early notions of average within an inquiry classroom to investigate the rich inferential reasoning that young children drew on to make sense of the questions: Is there a typical height for a student in year 3? If so, what is it? Based on their deliberations over several lessons, students' ideas about average and typicality evolved as meaning reasonable, contrary to atypical, most common (value or interval), middle, normative, and representative of the population. The case study reported here documents a new direction for

the development of children's conceptions of average in a classroom designed to elicit their informal inferential reasoning about data.

“A boundary-crossing approach to support students’ integration of statistical and work-related knowledge”

By Arthur Bakker and Sanne F. Akkerman

Volume 86, Number 2 (2014)

<http://link.springer.com/article/10.1007/s10649-013-9517-z>

Abstract: Vocational students and beginning professionals typically find it hard to integrate the mathematics and statistics that they have learned at school with work-related knowledge. To explore how such an integration process could be supported, we conducted an intervention in secondary vocational laboratory education. Our boundary-crossing approach was informed by the literature on boundary crossing and accompanying learning mechanisms (e.g., reflection in the form of perspective making and taking, and transformation in the form of hybridization). We hypothesized that reflection, as making and taking perspectives on school-taught and work-related knowledge, could lead to transformation, i.e., help students integrate these types of knowledge into a hybridized whole. Data collection included video and audio recordings of five 1-h meetings with three students, the data from their research projects, and interviews with the teacher and two workplace supervisors. The analysis of the students’ reasoning during the meetings revealed that their level of integrating school-taught statistics and work-related knowledge increased significantly and with a medium effect size. This suggests that a boundary-crossing approach can support students in integrating school-taught and work-related knowledge.

From Mathematics teaching in the middle school

<http://www.nctm.org/publications/toc.aspx?jrn1=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.

“Problem Solve with Presidential Data”

By Lynn G. Patterson and Kadie L. Patterson

Volume 19, Number 7 (2014)

<http://www.nctm.org/publications/article.aspx?id=41259>

Abstract: An engaging activity analyzing the average age of U.S. presidents not only integrates history and mathematics but also examines measures of central tendency and its appropriate uses.

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