



Teaching Bits: Statistics Education Articles from 2012

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Journal of Statistics Education Volume 20, Number 3 (2012),
www.amstat.org/publications/jse/v20n3/garfieldtb.pdf

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We located 46 articles that have been published from January 2012 through November 2012 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 *Teaching Statistics*

<http://www.rsscse.org.uk/publications/teaching-statistics>

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.

“Cleaning data: guess the olympian”

By Kate Richards and Neville Davies
Volume 34, number 1 (2012)

<http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9639.2011.00495.x/full>

Abstract: This article tackles the problem of what should be done with real textual data that are contaminated by errors of recording, particularly when the data contain words that are misspelt, unintentionally or otherwise.

“Going beyond the book: towards critical reading in statistics teaching”

By Andrew Gelman
Volume 34, number 3 (2012)
<http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9639.2010.00451.x/full>

Abstract: We consider three examples from our own teaching in which much was learned by critically examining examples from books. Even influential and well-regarded books can have examples where more can be learned with a small amount of additional effort.

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.

“Independent Interactive Inquiry-Based Learning Modules Using Audio-Visual Instruction In Statistics”

By Scott N. McDaniel and Lisa B. Green

Volume 6, number 1 (2012)

<http://escholarship.org/uc/item/322385kq>

Abstract: Simulations can make complex ideas easier for students to visualize and understand. It has been shown that guidance in the use of these simulations enhances students' learning. This paper describes the implementation and evaluation of the Independent Interactive Inquiry-based (I3) Learning Modules, which use existing open-source Java applets, combined with audio-visual instruction. Students are guided to discover and visualize important concepts in post-calculus and algebra-based courses in probability and statistics. Topics include the binomial distribution, confidence intervals, significance testing, and randomization. We show that this format can be used independently by students at the introductory and advanced levels. The percentage of students answering correctly on posttests was larger than that for pretests for three of the four modules described.

From *Journal for Research in Mathematics Education*

<http://www.nctm.org/publications/toc.aspx?jnl=jrme>

JRME promotes and disseminates disciplined scholarly inquiry into the teaching and learning of mathematics at all levels, including research reports, book reviews, and commentaries. JRME is published five times a year and it is available by paid subscription.

“Aspects of Students’ Reasoning About Variation in Empirical Sampling Distributions”

By Jennifer Noll and J. Michael Shaughnessy

Volume 43, number 5 (2012)

<http://www.nctm.org/publications/article.aspx?id=34631>

Abstract: Sampling tasks and sampling distributions provide a fertile realm for investigating students' conceptions of variability. A project-designed teaching episode on samples and sampling distributions was team-taught in 6 research classrooms (2 middle school and 4 high school) by the investigators and regular classroom mathematics teachers. Results suggest that

teachers explicitly need to focus on multiple aspects of distributions, especially on variability, to enhance students' reasoning about sampling distributions.

From *Mathematics Teaching in the Middle School*

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

The MTMS is a resource for middle school students, teachers and teacher educators. The journal focus is on intuitive, exploratory investigations that use informal reasoning to help students develop a strong conceptual basis that leads to greater mathematical abstraction. MTMS is published nine times a year and it is available by paid subscription.

“GAISEing into the Common Core of Statistics”

By Randall E. Groth and Anna E. Bargagliotti

Volume 18, number 1 (2012)

<http://www.nctm.org/publications/article.aspx?id=33666>

Abstract: Two recent sets of guidelines that intersect statistics and complement each other can be used to plot an orderly progression of study.

From *Educational Studies in Mathematics*

<http://www.springerlink.com/content/t7666420g273/>

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 times a year.

“Children’s concept of probability as inferred from their binary choices—revisited”

By Ruma Falk, Patricia Yudilevich-Assouline and Adily Elstein

Volume 81, number 2 (2012)

<http://www.springerlink.com/content/4344w8nv85w50447/?MUD=MP>

Abstract: Children had to choose one of two urns—each comprising beads of winning and losing colours—from which to draw a winning bead. Three experiments, aimed at diagnosing rules of choice and designed without confounding possible rules with each other, were conducted. The level of arithmetic difficulty of the trials was controlled so as not to distort the effects of the constituent variables of proportion. Children aged 4 to 11 first chose by more winning elements and proceeded with age to choices by greater proportion of winning elements. There were some indications of intermediate choices by fewer losing elements and by greater difference between the two colours. Distinguishing correct choices from favourable draws, namely acknowledging the role of chance in producing the outcome and insisting on the right choice, grew with age. Children switched rather early from considering one dimension to two; they combined the quantities of winning and losing elements either additively by difference or, with age, mostly multiplicatively by proportion. Guided playful activities for young children, based on this research, are suggested for fostering acquisition of the basic constituents of the probability

concept: uncertainty of outcome, quantification by proportion, and the reverse relation between the chances of complementary events.

From ZDM: *The International Journal on Mathematics Education*

<http://www.springerlink.com/content/120453>

ZDM is one of the oldest mathematics education research journals. ZDM publishes six themed issues a year. Papers in ZDM are by invitation only. ZDM is available free online.

“Seeing chance: perceptual reasoning as an epistemic resource for grounding compound event spaces”

By Dor Abrahamson

Volume 44, number 7 (2012)

<http://www.springerlink.com/content/01230112828536r2/fulltext.html>

Abstract: The mathematics subject matter of probability is notoriously challenging, and in particular the content of random compound events. When students analyze experiments, they often omit to discern variations as distinct events, e.g., HT and TH in the case of flipping a pair of coins, and thus infer erroneous predictions. Educators have addressed this conceptual difficulty by engaging students in actual experiments whose outcomes contradict the erroneous predictions. Yet whereas empirical activities *per se* are crucial for any probability design, because they introduce the pivotal contents of randomness, variance, sample size, and relations among them, empirical activities may not be the unique or best means for students to accept the logic of combinatorial analysis. Instead, learners may avail of their own pre-analytic perceptual judgments of the random generator itself so as to arrive at predictions that agree rather than conflict with mathematical analysis. I support this view first by detailing its philosophical, theoretical, and didactical foundations and then by presenting empirical findings from a design-based research project. Twenty-eight students aged 9–11 participated in tutorial, task-based clinical interviews that utilized an innovative random generator. Their predictions were mathematically correct even though initially they did not discern variations. Students were then led to recognize the formal event space as a semiotic means of objectifying these presymbolic notions. I elaborate on the thesis via micro-ethnographic analysis of key episodes from a paradigmatic case study.

“Developing statistical modelers and thinkers in an introductory, tertiary-level statistics course”

By Joan Garfield, Robert delMas and Andrew Zieffler

Volume 44, number 7 (2012)

<http://www.springerlink.com/content/66m67055164x1ww9/>

Abstract: While models are an important concept in statistics, few introductory statistics courses at the tertiary level put models at the core of the curriculum. This paper reports on a radically different approach to teaching statistics at the tertiary level, one that uses models and simulation as the organizing theme of the course. The focus on modeling and simulation—along with inference—was facilitated by having students use TinkerPlots™ software for all modeling and

analysis. Results from a 3-month teaching experiment suggest that a course focused on modeling and simulation through randomization and resampling methods in which students learn to think using a powerful and conceptual modeling tool can foster ways of thinking statistically. Furthermore, such an approach seems to help students develop experiences with and appreciation for the science and practice of statistics.

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