Journal of Statistics Education

Teaching Bits: Statistics Education Articles from 2008

Audbjorg Bjornsdottir and Joan Garfield
University of Minnesota

Journal of Statistics Education Volume 17, Number 1 (2009), www.amstat.org/v17n1/garfield.html

---

We located 66 articles that were published in 2008 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/ts/
An international journal for teachers that first appeared in 1979 and has been published three times a year ever since.

"The Humble Pie – Half-Baked or Well Done?"

By Neville Hunt and Houshang Mashhoudy
Volume 30, Number 1 (2008)
http://www.blackwell-synergy.com/doi/pdf/10.1111/j.1467-9639.2007.00306.x
Abstract: This article re-examines the much-maligned pie chart and provides justification for its use. It identifies common pitfalls when drawing pie charts in Microsoft Excel and offers advice on how to

avoid them.

"A Simple 'Pig' Game"

By Roger W. Johnson
Volume 30, Number 1 (2008)
http://www.blackwell-synergy.com/doi/full/10.1111/j.1467-9639.2007.00307.x
Abstract: Our pig game involves a series of tosses of a die with the possibility of a player's score improving with each additional toss. With each additional toss, however, there is also the chance of losing the entire score accumulated so far. Two different strategies for deciding how many tosses a player should attempt are developed and then compared in terms of expected score.

"Pricing Models Using Real Data"

By Tom Obremski
Volume 30, Number 2 (2008)
http://www3.interscience.wiley.com/journal/119398885/abstract
Abstract: A practical hands-on classroom exercise is described and illustrated using the price of an item as dependent variable throughout. The exercise is well-tested and affords the instructor a variety of approaches and levels.

"Implementing New Reform Guidelines in Teaching Introductory College Statistics Courses"

By Michelle Everson , Andrew Zieffler and Joan Garfield
Volume 30, Number 3 (2008)
http://www3.interscience.wiley.com/journal/121376345/abstract
Abstract: This article introduces the recently adopted Guidelines for the Assessment and Instruction in Statistics Education (GAISE) and provides two examples of introductory statistics courses that have been redesigned to better align with these guidelines.

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.

"Curvilinear relationships between statistics anxiety and performance among undergraduate students: Evidence for optimal anxiety"

By Jared Kelley, Ryan Zayac and Christopher Correia
Volume 7, Number 1 (2008)
http://www.stat.auckland.ac.nz/~iase/serj/SERJ7(1).pdf

Abstract: This study examined the possibility of a curvilinear relationship between statistics anxiety and performance in a statistics course. Eighty-three undergraduate students enrolled in an introductory course completed measures of statistics anxiety and need for achievement at seven points during the semester in conjunction with six tests. Statistics anxiety scores were reliable internally and across time. Statistics anxiety decreased during the term yet paradoxically became more strongly related to performance. Curvilinear models were better predictors of test performance than linear, suggesting a mid-range optimal level of statistics anxiety. However, students' need for achievement proved not to mediate the relationship between anxiety and performance. The authors suggest ways these findings may influence future research in statistics anxiety and classroom management of anxiety.

"Assessing teachers ´discourse about the pre-K-12 guidelines for assessment and instruction in statistics education (GAISE)"

By Randall E. Groth
Volume 7, Number 1 (2008)
http://www.stat.auckland.ac.nz/~iase/serj/SERJ7(1).pdf

Abstract: This paper starts from the premise that teachers' discourse communities influence how ideas for reform are implemented. In order to understand some of the discourse surrounding the reforms proposed by GAISE, an online focus group activity was conducted. The focus group consisted of pre-service and practicing teachers responsible for teaching statistics at various grade levels. Focus group discourse was used to formulate a set of working hypotheses about actions that need to be taken to facilitate the implementation of GAISE. Working hypotheses emphasized that statistics educators need to play roles in developing teachers' content knowledge, helping teachers understand the differences between mathematics and statistics, deepening teachers' pedagogical knowledge, building teachers' curricular knowledge, and influencing the writing of state-level standards.

"Reasoning about informal statistical inference: One statistician´s view."

By Allan J. Rossman
Volume 7, Number 2 (2008)
http://www.stat.auckland.ac.nz/~iase/serj/SERJ7(2).pdf

Abstract: This paper identifies key concepts and issues associated with the reasoning of informal statistical inference. I focus on key ideas of inference that I think all students should learn, including at secondary level as well as tertiary. I argue that a fundamental component of inference is to go beyond the data at hand, and I propose that statistical inference requires basing the inference on a probability

model. I present several examples using randomization tests for connecting the randomness used in collecting data to the inference to be drawn. I also mention some related points from psychology and indicate some points of contention among statisticians, which I hope will clarify rather than obscure issues.

"A framework to support research on informal inferential reasoning"

By Andrew Zieffler, Joan Garfield, Robert Delmas and Chris Reading
Volume 7, Number 2 (2008)
http://www.stat.auckland.ac.nz/~iase/serj/SERJ7(2).pdf
Abstract: Informal inferential reasoning is a relatively recent concept in the research literature. Several research studies have defined this type of cognitive process in slightly different ways. In this paper, a working definition of informal inferential reasoning based on an analysis of the key aspects of statistical inference, and on research from educational psychology, science education, and mathematics education is presented. Based on the literature reviewed and the working definition, suggestions are made for the types of tasks that can be used to study the nature and development of informal inferential reasoning. Suggestions for future research are offered along with implications for teaching.

From *The American Statistician*

http://pubs.amstat.org/loi/tas?cookieSet=1
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 monthly and is free for members of the American Statistical Association.

"The Assessing Student Retention of Essential Statistical Ideas: Perspectives, Priorities, and Possibilities"

By Mark L. Berenson, Jessica Utts, Karen A. Kinard, Deborah J. Rumsey, Albyn, Jones and Leonard M. Gaines
Volume 62, Number 1 (2008)
Abstract: Assessment has become the "buzzword" in academia; a demonstration of criteria used for the assessment of retention of what was learned is now mandated by various accrediting agencies. Whether we want our students to be good users of statistics who make better decisions, or good consumers of statistics who are better informed citizens, we must reflect on how key statistical concepts can be ingrained in the students' knowledge base. This article seeks to address the overall issue of assessing the retention of essential statistical ideas that transcend various disciplines.

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.

"Reconnecting Data and Chance"

By Cliff Konold and Sibel Kazak
Volume 2, Number 1 (2008)
http://repositories.cdlib.org/uclastat/cts/tise/vol2/iss1/art1/
Abstract: For the past 15 years, pre-university students in many countries including the United States have encountered data analysis and probability as separate, mostly independent strands. Classroom-based research suggests, however, that some of the difficulties students have in learning basic skills in Exploratory Data Analysis stem from a lack of rudimentary ideas in probability. We describe a recent project that is developing materials to support middle-school students in coming to see the "data in chance" and the "chance in data." Instruction focuses on four main ideas: model fit, distribution, signal-noise, and the Law of Large Numbers. Central to our approach is a new modeling and simulation capability that we are building into a future version of the data-analysis software TinkerPlots. We describe three classroom-tested probability investigations that employ an iterative model-fit process in which students evaluate successive theories by collecting and analyzing data. As distribution features become a focal point of students' explorations, signal and noise components of data become visible as variation around an "expected" distribution in repeated samples. An important part of students' learning experience, and one enhanced through visual aspects of TinkerPlots, is becoming able to see things in data they were previously unable to see.

"An Innovative Approach to Teaching Online Statistics Courses"

By Michelle G. Everson and Joan Garfield
Volume 1, Number 1 (2008)
http://repositories.cdlib.org/uclastat/cts/tise/vol2/iss1/art3/
Abstract: This paper describes two innovative online introductory statistics courses that utilize technology to create unique interactive learning environments. In these courses, technology is used to enable students to collaborate and learn from each other, in addition to learning from required course materials and the instructor. Technology is also introduced into the courses as a way to better illustrate important statistical concepts and provide students with tools to describe and analyze data. In this paper, special attention is paid to the way in which the GAISE recommendations have been implemented in one key component of the online courses: small-group discussion. Evaluative data gathered from students is used to describe how students perceive the discussion component of the courses, as well as how desired learning outcomes are being achieved. The paper concludes with a discussion of lessons learned from teaching an online statistics course, and implications for future development of online

statistics courses.

From *International Electronic Journal of Mathematics Education*

http://www.iejme.com/032008/main.htm
The International Electronic Journal of Mathematics Education is an academic journal devoted to the publication of research articles on all aspects of mathematics education. It is an online journal published three times in a year.

"Do You Want Me to Do It with Probability or with My Normal Thinking? Horizontal and Vertical Views on the Formation of Stochastic Conceptions"

By Susanne Prediger
Volume 3, Number 3 (2008)
http://www.iejme.com/
Abstract: Probability classrooms often fail to develop sustainable conceptions of probability as strategic tools that can be activated for decisions in everyday random situations. The article starts from the assumption that one important reason might be the often empirically reconstructed divergence between individual conceptions of probabilistic phenomena and the normative conceptions taught in probability classrooms, especially concerning pattern in random. Since the process of dealing with these phenomena cannot sufficiently be explained by existing frameworks alone, an alternative – horizontal - view on conceptual change is proposed. Its use for research and development within the so-called Educational Reconstruction Program is presented. The empirical part of the paper is based on a qualitative study with 10 game interviews. Central results concern the oscillation between conceptions and cognitive layers and the situations of their activation. In particular, diverging perspectives seem to root in contrasting foci of attention, namely the mathematically suitable long-term perspective being in concurrence to the more natural short-term attention to single outcomes. The Educational Reconstruction Program offers an interesting possibility to specify roots of obstacles and to develop guidelines for designing learning environments which respect the horizontal view.

From the *Mathematics Teacher*

http://my.nctm.org/eresources/journal_home.asp?journal_id=2
The *Mathematics Teacher* offers activities, lesson ideas, teaching strategies, and problems through in-depth articles, departments, and features. Materials are for secondary teachers, preservice teachers, and teacher educators. Article downloads are free to individual members who subscribe to *Mathematics Teacher*. Note: this is a special issue with five articles on teaching statistics.

"The Evolution of Pearson's Correlation Coefficient"

By Gary D. Kader and Christine A. Franklin
November 2008, Volume 102, Issue 4, 292
Abstract: This article describes an activity for developing the notion of association between two quantitative variables. By exploring a collection of scatter plots, the authors propose a nonstandard "intuitive" measure of association; and by examining properties of this measure, they develop the more standard measure, Pearson's Correlation Coefficient. The activity is designed to help students better understand how statistical measures are "invented" and why certain measures are preferred.

"Contemporary Curriculum Issues: Statistics in the High School Mathematics Curriculum: Building Sound Reasoning under Uncertain Conditions"

By Richard Scheaffer and Josh Tabor
August 2008, Volume 102, Issue 1, 56
Abstract: Article illustrates how GAISE can be used to create a K–12 trajectory of the development of basic ideas related to the distribution of a variable based on data : This is one of three coordinated articles that each appeared in the three NCTM journals (Teaching Children, Mathematics, Mathematics in the Middle School, and Mathematics Teacher). All are focused on a trajectory of developing statistical reasoning from elementary school to high school.

In addition to the articles listed above, there were papers published in the proceedings (on CD) of the Section on Statistical Education from the 2007 Joint Statistics Meetings (http://www.amstat.org/ASAStore/2007_JSM_Proceedings_CD_P208.cfm?UserID=125315&jsessionid=b2307161df014761e5c4), and the following two conferences:

- The Joint ICMI/IASE Study *Statistics in School Mathematics. Challenges for Teaching and Teacher Education* (June 30- 4 July 2008), http://www.ugr.es/~icmi/iase_study/
- OZCOTS 2008 - *6th Australian Conference on Teaching Statistics* (July 3-4, 2008) http://silmaril.math.sci.qut.edu.au/ozcots2008/index.html

---