Teaching Bits: Statistics Education Articles from 2009 and 2010

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We located 34 articles that have been published from November 2009 through June 2010 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 *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.

"Managing Case Discussions in Introductory Business Statistics Classes: Practical Approaches for Instructors"

By Marlene A. Smith and Peter G. Bryant.
Volume 63, Number 4 (2010)
http://pubs.amstat.org/doi/abs/10.1198/tast.2009.09053
Abstract: Case discussions have become an integral component of our business statistics courses. We have discovered that case discussion adds enormous benefits to the classroom and learning experience of our students even in a quantitatively based course like statistics. As we read about discussion-based methods, we discovered that the literature is mostly silent about the specific challenges of case teaching in statistics courses. This article is an attempt to fill that void. It provides a "how-to" starter's guide for those interested in incorporating case discussions in

statistics courses. It includes resources for background reading, tips on setting up a statistics case discussion course, and examples of four specific case discussions involving statistics topics. An illustrative case and instructor's notes that can be used on the first day of class are provided as well. Because we have had mixed reactions to conducting case discussions online, we believe that the use of case discussion in distance education statistics courses is a fruitful area for experimentation and research. Although our experience is in the business statistics classroom, this article is also applicable to statistics courses in other disciplines.

"Teaching Variation Reduction Using a Virtual Manufacturing Environment"

By Stefan H. Steiner and R. Jock MacKay.
Volume 63, Number 4 (2010)
http://pubs.amstat.org/doi/abs/10.1198/tast.2009.08042
Abstract: This article describes the virtual manufacturing environment Watfactory (freely available at http://services03.student.math.uwaterloo.ca:8080/~stat435/login.htm) and discusses its use in teaching process improvement. Watfactory provides a rich and realistic simulation of a manufacturing process and is accessed through a website requiring no software other than a Web browser. With Watfactory, students select, plan, and analyze the data from a sequence of empirical investigations of many different types, with the ultimate goal of reducing variation in the process output. We have found that using Watfactory addresses many shortcomings in traditional teaching methods for both undergraduate and industrial short courses.

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. It is available by paid subscription.

"A Web Site That Provides Resources for Assessing Students' Statistical Literacy, Reasoning and Thinking"

By Joan Garfield and Robert delMas.
Volume 32, Number 1 (2010)
http://www3.interscience.wiley.com/journal/123238050/abstract
Abstract: The Assessment Resource Tools for Improving Statistical Thinking (ARTIST) Web site was developed to provide high-quality assessment resources for faculty who teach statistics at the tertiary level but resources are also useful to statistics teachers at the secondary level. This article describes some of the numerous ARTIST resources and suggests ways teachers may use these assessment resources.

"Bayes Ice-Breaker"

By Alan Jessop
Volume 32, Number 1 (2010)
http://www3.interscience.wiley.com/journal/123238044/abstract
Abstract: Showing simply how statistical thinking can help in weighing evidence and reaching

decisions can be useful both as an introduction to an extended presentation of statistical theory and as an introduction to a looser discussion of the nature and value of data.

"Engaging Probability Students in Playing and Analysing a Simple Card Game"

By Robert J. Quinn, Tom S. Ball, and Zhixia You
http://www3.interscience.wiley.com/journal/123342802/abstract
Abstract: We present a simple card game whose payout depends on a player's strategy, as well as on chance. Solutions require the use of conditional analysis and the computation of expected values.

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.

"Cognitive and Non-Cognitive Factors Related to Students' Statistics Achievement"

By Francesca Chiesi and Caterina Primi.
http://www.stat.auckland.ac.nz/~iase/serj/SERJ9(1)_Chiesi_Primi.pdf
Abstract: The aim of this study was to investigate students' achievement in introductory statistics courses taking into account the relationships between cognitive and non-cognitive factors. It was hypothesised that achievement was related to background in mathematics (a cognitive variable), as well as to attitudes toward statistics and anxiety (non-cognitive variables). Students were presented with measures assessing their attitudes, mathematical competence, and anxiety toward courses and examinations at the beginning and at the end of their statistics course. Achievement was assessed by tasks assigned during the course, as well as by students' final grades and the number of exam failures. The results reveal the relationships between cognitive and non-cognitive factors, their changes during the course, and how both interact in predicting achievement.

"Elementary School Teachers' Comprehension of Data Displays"

By Timothy Jacobbe and Robert M. Horton
http://www.stat.auckland.ac.nz/~iase/serj/SERJ9(1)_Jacobbe_Horton.pdf
Abstract: This study investigated elementary school teachers' comprehension of data displays. Assessment, interview, and observation data were analyzed to determine their level of comprehension. Results revealed that the teachers were proficient at "reading the data" and computation types of "reading between the data" questions, but were unsuccessful with questions

that assessed higher levels of graphical comprehension. Many of the difficulties exhibited by the teachers appear to be attributable to a lack of exposure to the content. Implications for teacher preparation, professional development, and curricula development are discussed.

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.

"Shooting Free Throws, Probability, the Golden Ratio"

By Terry Goodman
Volume 103, Number 7 (2010)
http://www.nctm.org/eresources/article_summary.asp?URI=MT2010-03-482a&from=B
Abstract: A probability exploration built on shooting basketball free throws leads unexpectedly to the golden ratio.

"Investigating the Randomness of Numbers"

by Susan A. Peters
Volume 103, Number 7 (2010)
http://www.nctm.org/eresources/article_summary.asp?URI=MT2010-03-496a&from=B
Abstract: Statistics uses scientific tools but also requires the art of flexible and creative reasoning.

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.

"VISA: Reducing Technological Impact on Student Learning in an Introductory Statistics Course"

By Dmitriy S. Shaltayev, Harland Hodges, and Robert B. Hasbrouck
Volume 4, Number 1 (2010)
http://www.escholarship.org/uc/item/1gh2x5v5?display=all
Abstract: In this empirical study we compare student performance using two different teaching methods in introductory business statistics course. Two groups were taught in the computer lab with software available at students' fingertips while one was taught in the regular classroom with only a computer workstation for the instructor. VISA (Visual Interactive Statistical Analysis), an Excel-based analysis software package was used in classroom to perform computational analysis of the data in all three groups. Exam data and final course grades indicate that student

performance between the two methods was not affected by presence of the software in classroom for use by students. This leads us to conclude that VISA is an intuitive enough tool, which does not require a major learning curve, and can be mastered by students with minimal supervision. Second, we conclude that if the software used for statistics instruction is "teaching-friendly", then technology availability in the classroom does not affect learning efficiency. This allows instructors to concentrate more efforts in class teaching conceptually important material.

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