Teaching Bits: Statistics Education Articles from 2013

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I located 27 articles that have been published from January through July 2013 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 journal and a link to the journal's 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.

"Twenty-Five Analogies for Explaining Statistical Concepts"

By Roberto Behar, Pere Grima & Lluís Marco-Almagro
Volume 67, number 1 (2013)
http://www.tandfonline.com/doi/full/10.1080/00031305.2012.752408#preview
Abstract: The use of analogies is a resource that can be used for transmitting concepts and making classes more enjoyable. This article presents 25 analogies that we use in our introductory statistical courses for introducing concepts and clarifying possible doubts. We have found that these analogies draw students' attention and reinforce the ideas that we want to transmit.

"A Few Counter Examples Useful in Teaching Central Limit Theorems"

By Subhash C. Bagui, Dulal K. Bhaumik & K. L. Mehra
Volume 67, number 1 (2013)

http://www.tandfonline.com/doi/full/10.1080/00031305.2012.755361#.UeDBwJpYuI0

Abstract: In probability theory, central limit theorems (CLTs), broadly speaking, state that the distribution of the sum of a sequence of random variables (r.v.'s), suitably normalized, converges to a normal distribution as their number n increases indefinitely. However, the preceding convergence in distribution holds only under certain conditions, depending on the underlying probabilistic nature of this sequence of r.v.'s. If some of the assumed conditions are violated, the convergence may or may not hold, or if it does, this convergence may be to a nonnormal distribution. We shall illustrate this via a few counter examples. While teaching CLTs at an advanced level, counter examples can serve as useful tools for explaining the true nature of these CLTs and the consequences when some of the assumptions made are violated.

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.

"The danger of dichotomizing continuous variables: A visualization"

By Oliver Kuss
Volume 36, number 2 (2013)
http://onlinelibrary.wiley.com/doi/10.1111/test.12006/full
Abstract: Four rather different scatterplots of two variables X and Y are given, which, after dichotomizing X and Y, result in identical fourfold-tables misleadingly showing no association.

"A limitation with least squares predictions"

By Teresa L. Bittner
Volume 36, number 2 (2013)
http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9639.2012.00512.x/full
Abstract: Although researchers have documented that some data make larger contributions than others to predictions made with least squares models, it is relatively unknown that some data actually make no contribution to the predictions produced by these models. This article explores such noncontributory data.

"How much is it going to cost me to complete a collection of football trading cards?"

By Oke Gerke
Volume 36, number 2 (2013)
http://onlinelibrary.wiley.com/doi/10.1111/test.12005/full
Abstract: Trading cards for various sports and a range of other subjects such as architecture, animals, hobbies, and war have been in existence since the late nineteenth century and still enjoy great popularity. Two of the most prominent examples are baseball cards in the U.S. and football cards in Europe. Three strategies for collecting European football trading cards were investigated for two different groups: either a single collector or two collectors joining forces. An activity is

proposed in which students use a simulation to compute the factor by which the number of trading cards bought exceeds the number to be collected. This enables them to estimate the expected costs of completing a collection of trading cards. The overall expected costs vary considerably, depending on the strategy used. Savings for a team of two collectors as opposed to a single collector are indicated.

"Online course design: a statistics course example"

By Suzan Gazioglu
Volume 35, number 2 (2013)
http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9639.2012.00523.x/full
Abstract: Classroom-based learning has great value, but online classes are becoming quite popular in the academic world because of the tremendous opportunities they offer. This article outlines the author's journey through the planning, development and execution of an online statistics course.

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.

"Characterising Students' Interaction with TinkerPlots"

By Noleine Elizabeth Fitzallen
Volume 7, number 1 (2013)
http://www.escholarship.org/uc/item/1074n1dp#
Abstract: Exploration of the way in which students interacted with the software package, TinkerPlots Dynamic Data Exploration, to answer questions about a data set using different forms of graphical representations, revealed that the students used three dominant strategies – Snatch and Grab, Proceed and Falter, and Explore and Complete. The participants in the study were 12 year 5-and-6 students (11-12 years old) who completed data analysis activities and answered questions about the data analysis process undertaken. The data for the inquiry were collected by on-screen capture video as the students worked at the computer with TinkerPlots. Thematic analysis was used to explore the data to determine the students' strategies when conducting data analysis within the software environment.

"Virtual Discussion for Real Understanding: The Use of an Online Discussion Board in an Introductory Biostatistics Course"

By Kendra K Schmid
Volume 7, number 1 (2013)
http://www.escholarship.org/uc/item/89q3489f

Abstract: One of the challenges of teaching is engaging students in a subject they may not see as relevant to them. This issue is especially prevalent when teaching statistics to health science students as many do not consider statistics an important piece of their medical training. Additional difficulty is presented when teaching courses via distance technology or courses that are partially or completely online as the valuable class discussion component is lost. This paper focuses on fostering "discussion" about statistical concepts and how they relate to each student on an individual level. This paper describes the online discussion board as a tool incorporated to supplement classroom activities and not as one to be limited to the online class. Two activities where the discussion board can be utilized are described: one where students participate in a series of guided discussions through instructor provided, thought-provoking questions and another where students critique an article related to their field of study and post for discussion. The objectives are to enhance knowledge, develop critical thinking, gain an appreciation of how statistics is used in different fields, and provide opportunities for discussion outside the classroom. Students are able to discuss issues with classmates who can be in the classroom or abroad using a virtual environment. This approach has been successfully used in both purely online classes and in large graduate level biostatistics classes including both synchronous and asynchronous distance learners.

From *Educational Studies in Mathematics*

"Mapping the structure of knowledge for teaching nominal categorical data analysis"

By Randall E. Groth and Jennifer A. Bergner
Volume 87, number 2 (2013)
http://link.springer.com/article/10.1007/s10649-012-9452-4

Abstract: This report describes a model for mapping cognitive structures related to content knowledge for teaching. The model consists of knowledge elements pertinent to teaching a content domain, the nature of the connections among them, and a means for representing the elements and connections visually. The model is illustrated through empirical data generated as prospective teachers were in the process of developing knowledge for teaching nominal categorical data analysis. During a course focused on the development of statistical knowledge for teaching, the prospective teachers analyzed statistical problems, descriptions of children's statistical thinking, and related classroom scenarios. Their analyses suggested various types of knowledge structures in development. In some cases, they constructed all knowledge elements targeted in the course. In many cases, however, their knowledge structures had missing, incompatible, and/or disconnected elements preventing them from carrying out recommendations for teaching elementary nominal categorical data analysis in an optimal manner. The report contributes to teacher education by drawing attention to prospective teachers' learning needs, and it contributes to research on teachers' cognition by providing a method for modeling their cognitive structures.

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