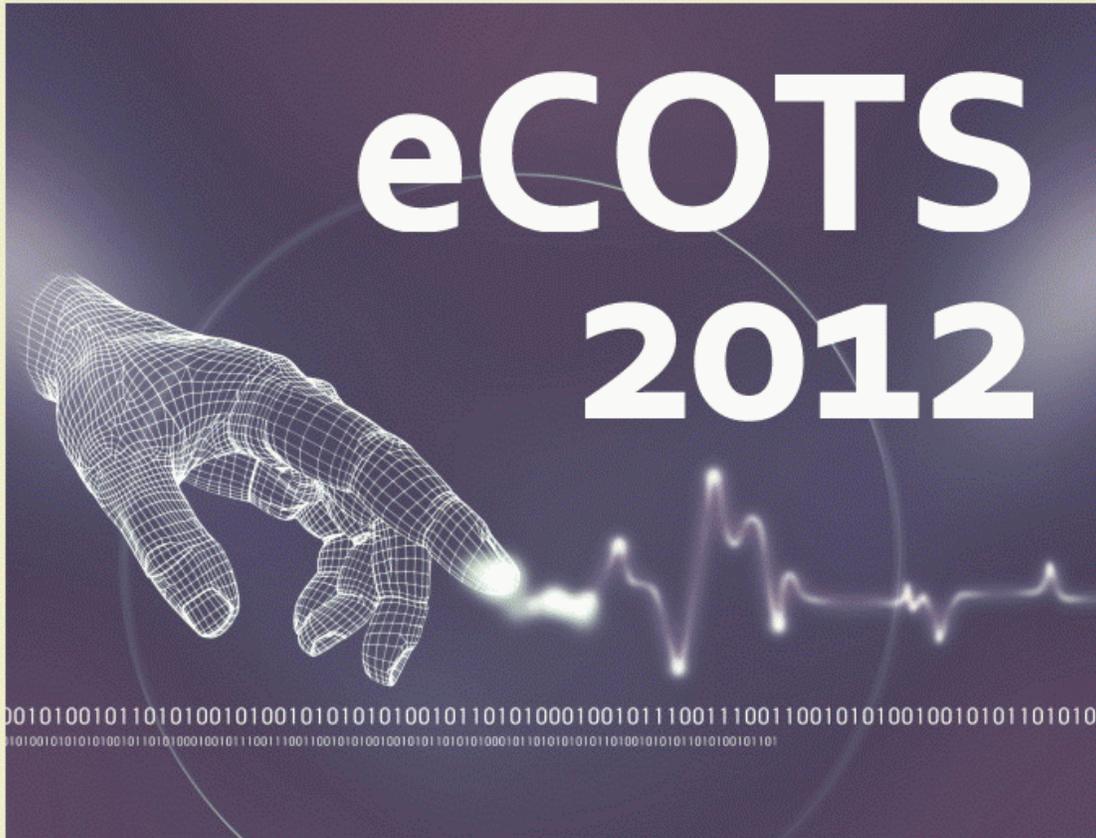




eCOTS 2012  
The First Biennial  
Electronic Conference On Teaching Statistics  
May 14-18, 2012

**eCOTS: Electronic Conference On Teaching Statistics**  
**May 14-18, 2012**



<a href="#">About</a>	<a href="#">Keynote Speakers</a>	<a href="#">Breakout Sessions</a>	<a href="#">Virtual Posters</a>	<a href="#">Registration</a> (Opens soon)
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eCOTS will be hosted using the product GoToWebinar. For those CAUSE friends in the United States and Canada both "voice over the internet" (VoIP) or a toll-free number for phone-in will be available. For our friends around the world, we are happy to offer VoIP for your participation. We will send more detailed instructions to registered participants as the conference nears.

There will be several two hour workshop options available on Thursday, May 17. Advanced registration (separate from eCOTS registration) is required to participate and participation is limited. An email will be sent to all eCOTS registrants with workshop and registration details, participation is limited to one workshop per eCOTS registrant. Once admitted to the workshop, you will receive separate access information for workshop participation.

Source: [www.causeweb.org/eCOTS/](http://www.causeweb.org/eCOTS/) as of April 10, 2012



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## About eCOTS

CAUSE will host the Electronic Conference On Teaching Statistics (eCOTS) from May 14-18, 2012. Just like the United States Conference On Teaching Statistics (USCOTS), eCOTS has been designed to focus on undergraduate-level statistics education (including AP Statistics), with a target audience of statistics teachers. Whereas USCOTS is held in odd-numbered years, eCOTS will occur during even-numbered years and seeks to provide a virtual meeting space for educators to share ideas, teaching methods, and research results. It is hoped that eCOTS will be a forum where statistics educators from around the world can network and connect as they learn how to incorporate new ideas, methods, and resources into their existing courses or programs.

The format of the conference will be as follows. On May 14-16, there will be 20 to 30 minute webinars by invited and peer reviewed session leaders. There will be approximately four of these webinars each day. Conference registrants are encouraged to attend the webinars as they are underway to ask questions and interact with the session's activities and other conference attendees. To ensure that all conference registrants can listen to webinars that they may have missed earlier in the week, the webinars will be recorded and available to registrants for review by May 17th. There will also be some virtual workshops for registrants to attend on May 17th that may each run for up to two hours. On May 18th, along with keynote presentations, the session leaders from each of the webinars will be arranged into panels--each focusing on one of the conference themes--and conference registrants can engage in question-and-answer sessions with each panel.

There will also be a virtual "poster" session as a part of this conference. A week before the conference, individuals who share posters will record short webinars that describe their work (up to 5 minutes in length) with no more than 10 slides within the webinar. Once all posters are recorded in this way, they will be placed in an area where conference registrants can view them and ask questions or make comments throughout the week. Poster presenters will be encouraged to check back throughout the week and respond to any questions/comments about their work.

Just as break-out sessions at USCOTS involve much activity and discussion, it is hoped the webinars through eCOTS will also be opportunities for audience engagement. eCOTS themes are:

1. **Teaching Statistics: Debating some of the Big Ideas**  
This theme will consist of a series of sessions--each with at least two presenters--where different "big ideas" about teaching statistics are debated.
2. **Statistics for the Modern Student**  
This theme will consist of a series of sessions about ways to motivate and engage our modern students who have grown up embedded in the digital age of big data, social media, and international connectivity.
3. **Commercial resources for Teaching Statistics**  
This theme will consist of webinars by eCOTS sponsors on their current products and resources for teaching college level statistics

eCOTS organizing Committee: Michelle Everson (Chair), University of Minnesota; Ellen Gundlach, Purdue University; Megan Mocko, University of Florida; Georgette Nicolaidis, Syracuse University; Dennis Pearl, Ohio State University; and Michael Posner, Villanova University



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## Keynote Speakers



### "Using A Fact Based World View To Engage Students"

with Hans Rosling, Karolinska Institute

**Abstract:** Major global changes are gradual and powerful, but many are too slow to reach the news media, and yet too fast to have made it to the textbooks. The Gapminder Foundation has found that new technologies allow for animation of international statistics and story-telling about major global trends. Hopefully this will help students see the beauty of statistics and encourage them to upgrade their knowledge and acquire a fact-based worldview.

**Bio:** [Hans Rosling](#) is a professor of International Health at [Karolinska Institutet](#), the medical university in Stockholm, Sweden. When working as a young doctor in Mozambique he discovered a previously unrecognized paralytic disease that his research team named Konzo. His 20 years of research on global health concerned the character of the links between economy and health in Africa, Asia and Latin America.

Dr. Rosling co-founded the Gapminder Foundation ([www.gapminder.org](http://www.gapminder.org)) with his son and daughter-in-law. The Foundation promotes a fact-based worldview by converting international statistics into moving, interactive, understandable and enjoyable graphics. This was first done by developing the Trendalyzer data visualization software acquired by Google in 2007. His award-winning lectures on global trends illustrate his vision of making statistics come alive for students and the public (an example: [Hans Rosling's 200 Countries, 200 Years, 4 Minutes - The Joy of Stats - BBC Four](#))



### "The Impact Of Technology On The Teaching Of Statistics"

with Webster West, Texas A&M University

**Abstract:** Over the past two decades, we have seen rapid technological advancements that have had a tremendous effect on statistical education both in terms of its content and its delivery. In this talk, we will take a nostalgic look back at this technological journey, and we will also look into the crystal ball to see where new technology may take statistical education in the future.

**Bio:** [Webster West](#) is a Professor of Statistics at [Texas A&M University](#). Shortly after completing his PhD in Statistics at Rice University in 1994, Dr. West began developing Internet resources for statistical education. In the mid 1990s, he started to construct interactive web-based java applets that help students understand difficult statistical concepts. To date, he has developed more than 50 such applets many of which now accompany introductory statistics textbooks. In the same vein, he began to develop a complete online data analysis package in 1997. With support from the National Science Foundation, his [StatCrunch](#) package has now blossomed into one of the most used statistical resources on the Web. In 2005, he received the CAUSEweb Resource of the Year Award and the Merlot Classics Award for the StatCrunch project. Currently, he is a PI (with Roger Woodard) of the NSF funded INCIST project - Improving National acceptance of Computationally Intensive Statistical Techniques - that is developing, field testing, and disseminating computationally intensive materials for teaching the topics in an introductory statistics course. He has also written the DoStat course management system which is used as a platform to offer distance courses at Texas A&M. Outside of software development, Dr. West has numerous research interests most of which (not surprisingly) involve a fair amount of statistical computing. He has also published extensively in the fields of changepoint analysis and toxicological risk assessment.



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## eCOTS breakout sessions designed to engage participants

**Join the Individual presentations on Monday to Wednesday May 14-16, 2012**

**Join the presenters in panel discussions on Friday May 18, 2012**

- "[Interactive Teaching of Probability Distributions Theory and Applications using Data, Models and Webapps](#)" with Ivo Dinov, UCLA; Kyle Siegrist, University of Alabama; and Dennis Pearl, Ohio State University
- "[Using advertisements to teach statistical literacy](#)" with Rose Martinez-Dawson, Clemson University
- "[Online Games for Teaching Statistics from the Data Games and Playing Games with a Purpose Projects](#)" with William Finzer, KCP Technologies; Cliff Konold, University of Massachusetts; and Shonda Kuiper, Grinnell College
- "[Statistical Computing: A Language or a Graphical Interface](#)" with Daniel Kaplan, Macalester College
- "[A debate of what we know, think we know, and don't know about the use of simulation and randomization-based methods as alternatives to the consensus curriculum of the Stat 101 course](#)" with Christopher Malone, Winona State University; and Nathan Tintle, Dordt College
- "[What Online Students Wish You Knew](#)" with Camille Fairbourn, Utah State University
- "[A Second Statistics Course is Needed: What should it be?](#)" with Marc Isaacson and Milo Schield, Augsburg College
- "[Simulations, Audience Response Systems and the Classroom: Engaging the Modern Student](#)" with S. Camille Peres and David M. Lane, Rice University
- "[Introducing Inference with Bootstrapping and Randomization](#)" with Kari Lock Morgan, Duke University
- "[Storytelling in the Statistics Classroom](#)" with Jeanne Albert and Bill Peterson, Middlebury College
- "[Data Visualization on the iPad](#)" with Mia Stephens, SAS Institute, JMP Division
- "[Learn new ways to engage your students and help them learn statistics by using W.H. Freeman's new online tools](#)" with Alan Dabney, Texas A&M University



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## eCOTS virtual posters for participants to share and discuss their work

**Virtual posters will be on display starting Monday May 14, 2012 for you to visit and leave your comments and questions**

- "Why do we teach Statistical Hypothesis Inference Tests?" with Paul Hewson, Plymouth University (England)
- "Using Randomization Tests and IPUMS-USA\* to Investigate the Gender Wage Gap" with Laura M. Schultz, Rowan University
- "On teaching statistical inference: What do p values (not) mean?" with Bruce Blaine, St. John Fisher College
- "A Two Semester Study: The Effects of an Audience Response System (ARS) on Achievement and Attitudes Towards Statistics in an Introductory Statistics Class" with Megan Mocko, University of Florida; Brad Hartaub, Kenyon College; and Tim Jacobbe, University of Florida
- "Validating an Interactive Approach to Teach Large Statistics Classes Based on the GAISE Recommendations" with Ramon Gomez, Florida International University
- "Be the Statistician: An approach for the modern student" with Melissa Sovak, California University of Pennsylvania
- "Techniques for Engaging Business Students in the Statistics Classroom" with Jane E Oppenlander, Union Graduate College
- "An On-line Statistics Course in a Bioethics Curriculum" with Jane Oppenlander, Union Graduate College
- "Making Statistics Read-ble and Vizi-ble" with Rebecca L Pierce, Ball State University
- "Making Statistics Make Sense with Web Applets" with Jonathan Lee, Western University
- "STATS4STEM - Formative Assesments, Data Sets, & Rweb" with Eric Simoneau, Boston Latin School
- "Engaging Auditory Learners with Statistical Sonifications" with Ethan Brown, University of Colorado
- "The Challenger Disaster" with Dean F. Poeth, Union Graduate College
- "Teaching the fundamentals of statistical practice: the three C's" with Alison Gibbs, University of Toronto
- "A study of the hand-on experiences in the survey of statistics course for the undergraduate students" with Wenning Feng, Michigan State University
- "Involving Undergraduates in Statistical Consulting" with Tisha Hooks, Winona State University
- "An exploratory study of knowledge retention in statistics: the concept of dispersion in different school levels" with Pedro Campos, University of Porto and Statistics Portugal
- "How to Teach Modern Statistics when You Don't Have Modern Technology" with Jonathan Oaks, Macomb Community College
- "The Canadian Statistics Educator (CSEN) Experience" with Bethany White, University of Western Ontario
- "Value and Relevance of an Engineering Statistics Course" with Kumer Pial Das, Lamar University
- "Big Data Generates Beguiling Coincidences" with Milo Schield, Augsburg College
- "Introducing the Scholarship of Teaching and Learning to Graduate Students Instructors" with Ulrike Genschel, Iowa State University



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## "Interactive Teaching of Probability Distributions Theory and Applications using Data, Models and Webapps"

with Ivo Dinov, UCLA; Kyle Siegrist, University of Alabama; and Dennis Pearl, Ohio State University

What are efficient, engaging, and modern pedagogical techniques to teach probability theory and applications that leave lasting impressions on learners? The probability [Distributome](#) project has developed portable, browser-accessible and extensible resources including:

- Computing probability and critical values for a wide array of distributions
- Exploring probability distribution properties and inter-distributional relations
- Fitting probability distribution models to data
- Virtual resampling and simulation experiments
- Integrated data, web-applications and learning-activities

We will show some of the Distributome web-resources ([distributome.org/meetings/eCOTS\\_2012](http://distributome.org/meetings/eCOTS_2012)) and discuss best practices for integrating these tools, web-applications, activities and learning materials in probability and statistics curricula.



Ivo Dinov



Kyle Siegrist



Dennis Pearl



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**"Using advertisements to teach statistical literacy"**  
with Rose Martinez-Dawson, Clemson University

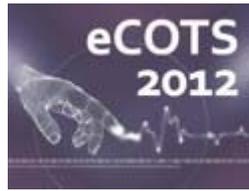
The modern student watches an average of 125 hours of television each month and during this time sees more than 1,600 thirty-second television commercials (Herr). In addition, more than 10 years ago, the average college student was on the Internet 100 minutes per day (Anderson, 2001), a figure that has only increased since then. For each 100 minutes on the Internet, approximately 16 minutes of these consists of viewing advertisements. One of the most popular sites visited on the Internet, Youtube, watched 7.4 hours monthly by the typical Youtube viewer ([www.frankwbaker.com/mediause.htm](http://www.frankwbaker.com/mediause.htm)), is a platform by which advertisers reach consumers through the use of stationary and pop-up advertisements. In short, students today are inundated with advertisements on television, Internet and print media; we can and should take advantage of this and use advertisements as a tool to teach statistical literacy.

In the Hierarchical Model of statistical literacy (Watson, 1997), statistical literacy is composed of three tiers of which developing a "questioning attitude" is the highest level. This attitude involves a more sophisticated understanding of statistical concepts to challenge claims. Because today's student is accustomed to advertising claims both on television and on the Internet, educators have an excellent opportunity to incorporate them into course material as a means of developing this questioning component of statistical literacy.

During this seminar, participants will be shown a variety of advertisements including print advertisements and commercials accessed from Youtube that can be used to enhance this questioning attitude of statistical literacy. In addition, results from research involving the use of advertisements on challenges students made to statistical claims in advertisements will be discussed. The audience will participate in a demonstration to illustrate this approach to teaching statistical literacy. Participants will gain an understanding of the role advertisements can play in teaching statistical literacy and ways in which advertisements can be incorporated into their courses.

## References

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## "Online Games for Teaching Statistics from the Data Games and Playing Games with a Purpose Projects"

with William Finzer, KCP Technologies; Cliff Konold, University of Massachusetts; and Shonda Kuiper, Grinnell College

Games can be used to engage students and motivate them to better understand the importance of statistical reasoning in a first or second course. The three presenters have created online games for use in teaching statistics. This session will introduce you to some of these games, their design philosophy, ways they are being used in classrooms, and some results from field tests.

From the Data Games Project, Bill Finzer will show a game for introducing conditional probability, and Cliff Konold will demonstrate a game that involves making inferences from sample averages. From the Playing games with a Purpose Project, Shonda Kuiper will demonstrate game based projects that allow students the opportunity to design and conduct their own research study.

You'll be asked to try out the games and bring questions to the panel discussion.



William Finzer



Cliff Konold



Shonda Kuiper



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"Statistical Computing: A Language or a Graphical Interface"  
with Daniel Kaplan, Macalester College

There are two basic kinds of statistical software used in classes: graphical-user interface systems such as Fathom or Minitab or spreadsheets versus language-based systems such as R. I'm proposing to run this session as a debate about the relative virtues of these different approaches to software.

I'm an advocate of language-based systems. I'd need to recruit a partisan of graphical-user interface systems. We would compare the two kinds of systems when applied to a set of statistical tasks that the debaters would agree on in advance. We'd also spend some time discussing the kinds of ways that students can be expected to use the systems --- what sorts of problems it's reasonable to give students, how to instruct students on the use of the software, and the range of problems to which the software and software skills can be applied.



Daniel Kaplan



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**"A debate of what we know, think we know, and don't know about the use of simulation and randomization-based methods as alternatives to the consensus curriculum of the Stat 101 course"**

with Christopher Malone, Winona State University; and Nathan Tintle, Dordt College

The GAISE guidelines (GAISE 2005) have greatly improved the pedagogy of Stat 101, the algebra-based introductory statistics course. However there has been relatively little re-thinking over time about the core content of the curriculum (Cobb 2007). The presenters have recently implemented alternative course sequences and proposed changes to the content of the Stat 101 course (Malone et al. 2010, Tintle et al. 2011). Malone and colleagues propose a significantly re-ordered course and currently use simulation-based methods to introduce the concepts necessary for the learning of traditional Stat 101 content. On the other hand, Tintle and colleagues propose a significantly re-ordered course and use randomization-based methods, in addition to simulation-based methods, to introduce and motivate Stat 101 content. The presenters will briefly discuss their motivations for considering alternative curriculums and will identify points of agreement. The focus of this presentation, however, will be to debate the points at which their two approaches differ, with an aim towards identifying open research questions of interest to the statistics education community. For example, should we discuss randomization methods? Should we teach the bootstrap? How should students be exposed to simulating a null model? What's the best way to introduce confidence intervals? And much more!

**Methods to Engage the Audience:**

This presentation will be a debate on a topic that has received a significant amount of attention recently from the statistics education community. Below is a tentative list of debate questions.

1. Should we be doing randomization-based methods in courses where expectations are we cover XYZ?
2. Should we be teaching the bootstrap?
3. What's the best way to introduce confidence intervals?
4. What is the appropriate background knowledge before introducing students to null/alt hypothesis, p-value concepts, etc.?
5. How should we be simulating the null model?

**Goals of Presentation:**

1. The presenters will share with audience the most recent advances in the use of simulation and randomization-based methods in the teaching of the Stat 101 course.
2. The presenters will discuss their experiences, both positive and negative, with the use of simulation and randomization-based methods in the teaching of the Stat 101 course.
3. Some of the open research questions regarding this topic will be discussed. Audience participation is expected throughout this discussion.



Christopher Malone



Nathan Tintle



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**"What Online Students Wish You Knew"**  
with Camille Fairbourn, Utah State University

Using research in instructional design for online teaching and learning, together with feedback from actual online statistics students, this session will address why students request and take online classes, what they need to be successful, and what things instructors can provide to make the experience a positive one. Participants in this session will learn about and discuss high-priority components for a functioning online course such as clear organization and professor-student interaction. Weâ€™ll also talk about elements of design that take a course from functioning to excellent. Iâ€™ll provide examples and links to resources and tools that make all of this manageable. This session will be a good starting place for those instructors ready to begin teaching online and give more experienced online instructors suggestions for taking their courses to the next level.



Camille Fairbourn



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**"A Second Statistics Course is Needed: What should it be?"**  
with Marc Isaacson and Milo Schield, Augsburg College

Big data, AP stats and the common core are driving the need for a "second" statistics course. What should it be? Isaacson will argue for a Statistical Literacy course that emphasizes breadth. Schield will argue for an advanced-topics follow-on course that emphasizes depth.

Isaacson will argue that the traditional inference course doesn't have time for important topics such as coincidences, confounding, evaluating surveys and studies, and "Where do statistics come from?" so a statistical literacy course is needed.

Schild will argue that the 50% of college graduates who are in quantitative majors and are required to take a statistical inference course need a follow-on applications course. This course should focus on inference-related applications (ANOVA and web analytics), modelling (linear and logistic regression), simulation (boot strapping and financial modeling) and other advanced topics (factor and cluster analysis; epidemiology and causation in observational studies).

Participants will be given specific examples of each topic so they can better appreciate their value to students. Participants will be invited to support either side or both during the presentation.

[Schield has taught the advanced modeling course using linear and logistic regression, an MBA course in quantitative methods, and is using web analytics to make business decisions. Isaacson developed the first Statistical Literacy course online and the first Statistical Literacy for Managers course.]



Marc Isaacson



Milo Schield



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## "Simulations, Audience Response Systems and the Classroom: Engaging the Modern Student" with S. Camille Peres and David M. Lane, Rice University

The "modern student" prefers active to passive learning. Two technological developments that have facilitated the design of an active classroom are interactive simulations and audience response systems. We believe these technologies can be used synergistically. Here we describe the way we have integrated the use of simulations into the classroom lectures with the an audience response system (ARS).

The query first (QF) method involves students answering questions about the concept the simulation illustrates before they interact with it and then answering those same questions again after they have worked with the simulation (Garfield, delMas, & Chance, 1999; Peres, Lane, & Griggs, 2010). The benefits of using the this method are (1) that the students start thinking about the concepts before interacting with the simulations and (2) they (and we) get immediate feedback on their comprehension of the material when they answer the post-simulation questions. The ARS is used with the simulations so that students answers to the initial query are entered on an ARS.

The benefits of using the ARS in this process is that students tend to enjoy both the interactive nature of the ARS and the anonymity. Many of the students have told us personally that they are embarrassed to have their fellow students know the concepts they find difficult. The ARS system allows them to engage without risking embarrassment.

A typical use of simulations with the ARS system is as follows:

- After lecturing about a particular topic, as a class, we ask students questions related to the simulation we are about to demonstrate and students respond using the ARS.
- Next, we step them through the fundamental aspects of the simulation and how to interact with it. Students then explore the answers to the questions on their own using the simulation. After working with the simulations for a period time and sometimes receiving help using it, the students answer the questions again using the ARS. This second round of questions gives us information about which of the concepts the students understood and which concepts need further review. We had initially expected the second round of questions to be unnecessary since the students would be working with the simulation to answer the questions but we have consistently found the second round to be very helpful since it gives us and the students direct information about how they are doing.

We propose to demonstrate this process, provide some feedback from students who experienced this in class, and discuss further ways ARS's could be used with simulations.



S. Camille Peres



David M. Lane



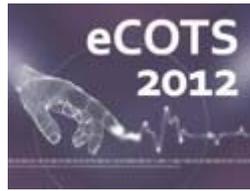
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**"Introducing Inference with Bootstrapping and Randomization"**  
with Kari Lock Morgan, Duke University

While formulas and distributional tables were once necessary for teaching confidence intervals and hypothesis tests, computers have made simulation methods an attractive alternative. We choose to introduce inference using simulation methods because they require less background knowledge, the same procedure can be applied to any parameter of interest, and most importantly, the methods for generating intervals and p-values are intrinsically connected to the very concepts we most want students to understand. We'll discuss how and why we now use simulation methods to introduce inference, how they can be integrated into the existing curriculum, and outcomes from teaching with this approach. We'll also demonstrate new user-friendly applets for teaching and using simulation methods.



Kari Lock Morgan



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**"Storytelling in the Statistics Classroom"**  
with Jeanne Albert and Bill Peterson, Middlebury College

Stories from the news can be a great way to introduce and motivate key concepts in statistics and probability, as well as promote discussion and interaction among students. Whether through "serious" stories that explore a topic of significant import (for example, evaluating cancer risk) or through more "playful" examples (do dogs really look like their owners?) storytelling invites students to engage more fully with the course material. In this session the presenters will describe their motivation for using stories and storytelling in the statistics classroom. We will provide examples and an interactive exercise during which participants will be invited to develop materials for their own classes. We will also discuss some resources that are both convenient and useful.



Jeanne Albert



Bill Peterson



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**"Data Visualization on the iPad"**  
with Mia Stephens, SAS Institute, JMP Division

What if your students could graphically explore data with a touch of the finger? What if their curious minds aren't constrained to menus, mouse clicks, or keystrokes (or, writing code)? Would this change the way they learn and how much they grasp?

The JMP Graph Builder App for the iPad is a pedagogical breakthrough. Drag variables into X or Y zones and tap graph icons to add colorful bar charts, box plots, lines and other graphs. Move the variables, or add grouping variables, and see the story unfold. This degree of interactivity and data intimacy will shift the learning (and teaching) experience.



Mia Stephens



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**"Learn new ways to engage your students and help them learn statistics by using W.H. Freeman's new online tools"**

with Alan Dabney, Texas A&M University

Designed using recent educational research, Learning Curve is a new formative assessment program that combines adaptive question selection, personalized study plans, and state-of-the-art question analysis reports. Its game-like quizzing activities keep students engaged while helping them focus on the areas they need to study the most.

Powered by R, CrunchIt! 3.0 is a fully-functional statistical software package that delivers accurate output with an easy-to-use interface and a spreadsheet-like data grid. CrunchIt! is completely web-based. There is no software installation required, and all of the data sets needed for exercises and examples come pre-loaded.

The LaunchPad ready-to-use course saves instructors hours of prep time. Pre-built modules offer a complete unit-by-unit breakdown of the textbook with carefully selected and arranged assignments, activities, and quizzes that can be used as is or that can be modified to suit your course.



Alan Dabney