Open Access!: Review of *Online Statistics: An Interactive Multimedia Course of Study* by David Lane

Samuel L. Tunstall
Michigan State University, stunstal@trinity.edu

Recommended Citation

Open Access!: Review of *Online Statistics: An Interactive Multimedia Course of Study* by David Lane

Abstract

David M. Lane (project leader). *Online Statistics Education: An Interactive Multimedia Course of Study* (http://onlinestatbook.com/)
Also: David M. Lane (primary author and editor), with David Scott, Mikki Hebl, Rudy Guerra, Dan Osherson, and Heidi Zimmer. *Introduction to Statistics.* Online edition (http://onlinestatbook.com/Online_Statistics_Education.pdf), 694 pp.

It is rare that students receive high-quality textbooks for free, but David Lane's *Online Statistics: An Interactive Multimedia Course of Study* permits precisely that. This review gives an overview of the many features in Lane's online textbook, including the Java Applets, the textbook itself, and the resources available for instructors. A discussion of uses of the site, as well as a comparison of the text to alternative online statistics textbooks, is included.

Keywords
introductory statistics, textbook, review

Creative Commons License

Cover Page Footnote

Samuel Luke Tunstall is a graduate student in mathematics education and University Distinguished Fellow at Michigan State University. He has taught at multiple levels and is interested in curricula that promote quantitative literacy.

Introduction

Today there is no shortage of introductory statistics textbooks for post-secondary students. Publishers Pearson, Wiley, and W.H. Freeman (to name a few) all offer a myriad of different texts for students taking their first course in the subject. It is no surprise that stock prices of these companies continue to rise as students purchase their textbooks each semester. This environment makes David Lane's *Online Statistics: An Interactive Multimedia Course of Study*[1] an actual windfall for both students and their instructors. The book (Lane 2015) is free; moreover, it includes interactive simulations, embedded questions, as well as iPad and ePub formats for users with e-readers.

This cornucopia of resources did not happen in one fell swoop. A statistics professor at Rice University, David Lane began writing the online "book" in 1988. For its debut, he named it HyperStat and made it available as a software package for Macintosh computers (Lane 1993). As the Macintosh platform declined in popularity over the next decade, though, the book went out of print and Lane put the hyper-linked text portion online. Notwithstanding, all was not lost, as in 1997 Lane and his colleagues at Rice used an NSF grant to develop Java simulations, forming the Rice Virtual Lab in Statistics (RVLS)[2]. The RVLS used HyperStat text for the exposition and explanation in the simulations. From there, Lane added new chapters, interactive test questions, real data for examples, and simulation updates, giving the entity its current name. Building upon the first edition, Lane developed the second between 2010 and 2013, expanding the content by adding chapters and case studies. Lane's goal for the second edition was to ensure that the text could be used as a standalone text for a course, and to that end he developed instructor resources (to be discussed later). Thus we have the current edition of *Online Statistics*, discussed below.

Book Overview

As any statistics instructor knows, there are myriad topic variations which one could use for a one- or two-semester course. Textbooks for such a class often begin with descriptive statistics and end with multiple linear regression or parameter-free tests, with the instructor left to choose among what time permits. Lane's two-semester text is hardly different. The table of contents is listed below; note that the sequencing of content is relatively standard for an introductory statistics progression. A nice aspect of the sequencing is that if an instructor desires to go out of order, each section specifically notes what chapters are

---

[1] http://onlinestatbook.com/index.html
[2] http://onlinestatbook.com/rvls.html

prerequisite for understanding the material. As discussed later, I used the text and have no qualms with its sequencing:

- Introduction
- Graphing Distributions
- Summarizing Distributions
- Describing Bivariate Data
- Probability
- Research Design
- Normal Distributions
- Advanced Graphs
- Sampling Distributions
- Estimation
- Logic of Hypothesis Testing

- Testing Means
- Power
- Regression
- ANOVA
- Transformations
- Chi Square
- Distribution Free Tests
- Effect Size
- Case Studies
- Calculators
- Glossary

A distinguishing factor for Lane's text – aside from the format – is its simplicity. There are few frills (e.g., career explorations, unnecessary pictures). Indeed, with little exposition, *Online Statistics* delivers motivating examples, notes, multiple-choice questions at the end of each section, and exercises following each chapter. Students (and instructors) may find the latter component frustrating. If, for example, students are learning about the sampling distribution of the difference between two means, they have to go to the end of the chapter on sampling distributions as a whole, where the exercises *are not* demarcated by the section they arise from. Of course, an instructor assigning problems can see the distinctions among problems; however, students studying on their own would likely struggle. Another component that students might find frustrating is that there is not an abundance of exercises at the end of each chapter; in continuing the aforementioned example, a student would only find 22 exercises covering the entire five-section chapter on sampling distributions. With that said, instructors interested in obtaining the solutions to the latter questions need only email Lane.

A wonderful feature of the text is that it is available in multiple formats; one can experience it via a web browser, mobile phone, tablet/iPad/e-reader, or in any PDF reader. For any of the aforementioned digital devices, one may watch videos in place of reading the text. For those wishing to read the book, *Online Statistics* is 694 pages. Although this number may seem large, recall that it would likely take at least two semesters to cover; moreover, note that each page is small, holding less text than a page does in a traditional text such as Moore et al.'s (2015) book, discussed below. As seen in the table of contents, the text has twenty-two chapters; in addition there are thirty-five interactive simulations. For mobile phones, one can easily access all of the online features, save for the Java-based simulations. With a tablet, one can access all of the text's features, reading it like an interactive text – precisely what Lane had in mind.

Table 1.
Features of Current Online Introductory Statistics Textbooks

	Price Options	Pages	Features
Online Statistics **(Lane 2015)**	Free online No hard-copy available	694	Available online, as a PDF file, and for any mobile device; includes online videos for all sections; has interactive questions following each section; includes case studies for each chapter; has high-quality simulations for nearly all chapters; has probability distribution calculators; instructor's manual and PowerPoint slides are available
OpenIntro Statistics **(Diez et al. 2015)**	Free online Hard-copy available for roughly $10 on Amazon	436	Available in PDF format and as a textbook; has data sets, labs and lessons for using R and SAS; includes videos for selected sections; some topics – such as one- and two-way ANOVA are treated only lightly
Introduction to the Practice of Statistics **(Moore et al. 2015)**	Hard-copy available for roughly $200 on Amazon (this price includes the e-book) Online e-book access for $94	832	Available online if text is purchased new; Applets available in the e-book platform; includes interactive quizzing; online videos are available for all sections; proprietary software available for data analysis

Table 1 compares Lane's book with two other resources available in an online format. As one can discern from the table, Lane's price point is not novel. A similar organization, OpenIntro, has offered a statistics textbook for free online and for roughly ten dollars in paperback since 2013 (Diez et al. 2015). *OpenIntro Statistics* does not have online simulations and has fewer chapters than does *Online Statistics* – hence its fewer pages. I have had the opportunity of using all three books found in Table 1 and prefer Lane's for this reason. Another point that arises from Table 1 is that Moore et al.'s (2015) text offers online e-book access for roughly $90 (if one does not want the physical copy). Such costs are becoming a trend among statistics texts from other publishers, including Pearson and Wiley.

Potential Uses

As with any free resource, one may use the text as much (or as little) as one would like in the classroom. Following are some examples.

Supplementing a Course

I used *Online Statistics* as a supplement for an introductory statistics course taught over the summer. Rather than having a textbook for the course, I gave students lecture notes that aligned with those found in the book, referring students to the site if they wanted further explanation or when an Applet could provide an additional, visual explanation. A helpful property of the simulations is that they all include detailed instructions on how to use them before students can begin.

Simulations that my students found especially beneficial included: Sampling distribution, mean versus median, conditional probability, Bayes' Theorem, and linear fit. A major selling point for most of the students was the price. Indeed, it is difficult to get much better than free. Additionally, students liked that the text did not have a significant amount of exposition, or "fluff," to use their word. I also occasionally used the exercises at the end of each chapter; although there were not as many as one would find in a typical statistics text, Lane includes a sufficient amount of thought-provoking questions (with solutions to boot). When students in the course asked for more questions, I simply scanned and sent problems from other appropriate texts.

For a Standalone Course

Even with the above discussion, it is easy to understand that some instructors might be wary of taking the leap to a textbook that is completely online. Indeed, there *really is no* hard-copy available, save for what one might do with their own printer. For instructors reliant upon such a copy, I recommend using the text as a supplement one semester and making a final decision upon later reflection. Additionally, one may find it beneficial to look into *OpenIntro Statistics,* as it is available for free online, and hard copies are available for a mere $10. But, for those comfortable using an online book, Lane's *Online Statistics* is a wonderful text for all of the reasons discussed above. Though one might have a few students disappointed that they do not get a paper copy, most will likely not only appreciate the price, but also the concise exposition, instructional videos, high-quality Applets, and interactive questions in each section.

Conclusion

Like nearly any textbook, *Online Statistics* is unfinished. There is content to add, data to update, and sections to rearrange. All the while, per the author David Lane, the resource will likely evolve in increments, rather than in discrete chunks each year. As we have discussed, an introductory statistics instructor can use this in a given semester with little fear; on nearly any platform, students have access to text, video, and interaction – all for free. Given the heavily digitized age we live in, it can be argued that such a resource has become an expectation for students, rather than a surprise. So, for the coming semester, why not meet that expectation? You will not regret it.

References

Cetinkaya-Rundel, M., Diez, D. M., and Barr, C. R. 2013. *OpenIntro statistics: An open-source textbook.* OpenIntro, Inc.

Lane, D. M. 1993. *HyperStat: Hypermedia for learning statistics and analyzing data*. New York, NY: Academic Press.

———. 2015. *Online Statistics: An Interactive Multimedia Course of Study*. Rice University, University of Houston Clear Lake, and Tufts University. http://onlinestatbook.com/ (accessed December 11th, 2015)

Moore, D. S., McCabe, G. P., and Craig, B. A. 2015. *Introduction to the practice of statistics*. New York, NY: WH Freeman and Company.