

West: Response

I would like to thank the four authors for their insightful and thought-provoking comments to my article "Textbooks 2.0." Without having access to the other articles that are a part of this collection on the future of the textbook, I can only infer from the comments that the other articles represent a wide range of interesting possibilities. I cannot think of a better discussion that we could be having within the virtual pages of TISE at this juncture in time as it appears that technology is having and will continue to have a tremendous impact on statistics education. This impact is not limited to our mechanism for delivering content but it is now playing a more significant role in the makeup of that content as many authors/developers focus on computationally intensive approaches involving resampling and simulation.

Cobb did an excellent job of outlining the likelihood of success for the evolutionary versus revolutionary approaches in this arena. He correctly classified the approach I described as being somewhat incremental with an emphasis on packaging existing content in new electronic formats supported by new technology like videos and applets. Rossman and Chance even question the added value of this small step approach noting that the electronic medium has much more to offer in terms of interactivity than what I presented. With my article I was trying to entice the TISE readership to take a step away from their comfort zone of the physical text by outlining some of the numerous advantages that I think the electronic medium has to offer without focusing a great deal on content. In short, when it comes to education, I believe that evolution is far more likely to be successful than revolution. The approach I describe offers advantages in terms of search ability, accessibility, instructor customization, student personalization and, of course, price. Don't let my soft sell fool you though. I am a closet revolutionary with grand designs on how technology may have a much greater impact on the content of statistics courses. I simply think baby steps are more likely to move us along a positive trajectory in this regard.

And now about those exercises! Velleman as well as Rossman and Chance take some exception for my preference of taking exercises out of the text and making them algorithmic when possible. I should first say that my goal was not to take all exercises out of the text, but rather the lengthy list of end-of-chapter problems that are typically used as homework. I am all for the examples within the text using an interactive approach where students can step through the problem solving process with appropriate feedback along the way. I am, however, a strong believer in replication, and this is where the algorithmic approach comes into play. In my experience, these types of exercises can be used to build student confidence in both the conceptual and mechanical parts of an introductory course. This confidence can even help encourage students to develop a desire for deeper understanding of the material. The feedback mechanisms are also outstanding. I don't think this is well replicated in a traditional model where students turn in an assignment and then wait a week to get it back. Velleman's distaste for the algorithmic approach seems

to be rooted in a fundamental misunderstanding for how these systems work. The idea that such systems have trouble handling data sets or that when they do, grading is somehow problematic is simply wrong. I have personally developed numerous exercises where large data sets are algorithmically generated in a real world context. The answers to these exercises are computed and stored when the underlying data set is simulated. Therefore, grading is a nonissue. Furthermore, these data sets can be automatically loaded into StatCrunch so the student can focus on analyzing the data and not on the more menial task of data entry. The ability to repeat these exercises with a new scenario and accompanying dataset allows the student to develop a broader set of experiences in applying the concepts and methods from the course. In fact, I have yet to find an exercise that I think is not better in an algorithmic form. I have even found electronic assessment systems to allow me to more quickly and effectively grade short writing assignments based on algorithmic data.

In the months since I wrote the original article, there have been significant technological advancements. New generations of smart phones and tablets from Apple, Google, Microsoft and others have been introduced which feature better graphics and processing power at a cheaper price. Over this time period, I spent a significant amount of time working on these devices as I developed a new version of StatCrunch to work on them. While I was initially apprehensive about the capability of the mobile environment for this purpose, I ended up walking away with the belief that this environment is incredibly powerful and is most likely the future of individual student computing. I think the staggering number of sales of these devices will eventually force the academic community to move to an electronic format for its textbooks. Amazon announced last year that the sale of eBooks surpassed its sales of printed texts for the first time. Since that time, the trend has only continued. As to whether the content developed in this format will be based on free texts developed by a community of willing instructors or through the traditional publisher model, I must restate my prediction for the latter. While good-hearted in nature, I don't think it is realistic for instructors to dedicate the time and possibly their own resources to keep such projects alive for years or even decades. As Utts points out in her comments, the amount of effort to produce materials can be overwhelming and in fact detrimental to the typical career of an academic. There have been numerous free statistical texts developed for Web-based delivery over the past two decades, but none of them have succeeded in terms of large-scale adoption and most generally languish over time. Perhaps my own experiences are relevant to this discussion as well. After originally developing StatCrunch in the mid 1990s, I gave it away for free for almost a decade. The user base grew over that time to a respectable level as I poured hours of my own time and financial resources into the project. However, after the folks at Pearson took over distribution with a small usage fee, the number of students using the software increased by a full order of magnitude in less than three years. Developing, managing and supporting quality software and media content costs significant time and money. Flag waving, prodding and handholding do as well.