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IN THIS GUEST ARTICLE Susan Pariseau compares three new editions of texts that are suitable for an introductory course in Business Statistics.

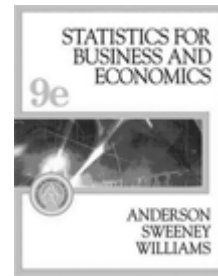
The Business of Teaching Statistics

by Susan E. Pariseau, Merrimack College

A few years ago, while redesigning a statistics course, the author had the opportunity to conduct several focus groups in order to determine what was important to student and faculty “customers.” The following requirements, which may be related to the use of a specific textbook, were most often mentioned by these “customers”: (1) foundation for subsequent courses, (2) development of computer skills, (3) emphasis on analysis and understanding, and (4) use of real-world applications. These requirements are considered in the review of three texts that are suitable for teaching introductory statistics in a two-semester course sequence. The three texts reviewed are *Statistics for Business and Economics* (9th edition) by David R. Anderson, Dennis J. Sweeney, and Thomas A. Williams; *Basic Business Statistics: Concepts and Applications* (9th edition) by Mark L. Berenson, David M. Levine, and Timothy C. Krehbiel; and *Statistical Techniques in Business and Economics* (12th edition) by Douglas A. Lind, William G. Marchal, and Samuel A. Wathen.

All three texts are well established in the field and all have been in print for many years. Each of the authors has recently completed a new edition with either a 2004 or 2005 copyright. As one can see in the table below, the material coverage by chapter is similar and each of the books provides a comprehensive coverage of statistics and its application to the fields of business and economics. Thus, any of these texts would allow a professor to provide a foundation for upper-level courses.

Each of the three texts has an accompanying Instructor’s CD-ROM that contains the instructor’s manual, test bank and PowerPoint presentations.



Statistics for Business and Economics (9th ed.)

David R. Anderson, Dennis J. Sweeney, Thomas A. Williams

South-Western, 2004, <http://www.swlearning.com/>

EACH CHAPTER BEGINS

with a Statistics in Practice segment which provides a real-world application of the material presented in the chapter. Numerous problems, divided into two categories, methods and applications, can be found at the end of each chapter section. Self-test exercises, with solutions at the end of the book, are also included to help the students test their understanding. The Notes and Comments segments found at the end of some sections offer additional insights and may include recommendations for application. Each chapter concludes with a summary, a glossary, key formulas, and supplementary exercises. Included in the text along with 28 case problems are 350 examples and exercises based on real data, including data drawn from the *Wall Street Journal*, *USA Today*, *Fortune* and *Barron’s*. These cases provide students with an opportunity to analyze larger data sets and prepare managerial reports, thus learning ways in which different statistical analyses may be appropriately used as aids to decision making. The instructor’s CD-ROM provides complete computer output and written solutions for each of the cases.

The data sets for the problems and cases are available, in both Microsoft Excel and MINITAB formats, on the student CD-ROM that accompanies the text. MINITAB and Excel appendices appear at the end of most chapters in the text. The authors have



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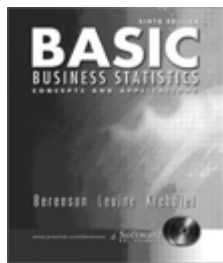
versity of Rhode Island and PhD from the University of Massachusetts - Amherst. She has served the Decision Sciences Institute as vice president and is a past president of NEDSI. Her current research interests include lean manufacturing, Six Sigma®, ISO 9000, and curriculum design.

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not included an Excel add-in. Since many professors have adopted Excel for statistical analysis because it will be available to students in the workplace, it makes sense to provide them with the tool as it will appear on their computer at work—without an add-in.

Overall, the PowerPoint slides are excellent, although the extensive use of animation and the frequent necessity for forwarding the slides could prove to be irritating for use in a classroom environment.

The ninth edition includes a new chapter on decision analysis and new sections on logistic regression, shape of distributions, and the normal approximation of the binomial. The use of *p*-values is emphasized for hypothesis testing and the pooled variance *t*-test has been eliminated. The accompanying CD-ROM includes a chapter on sampling.



Basic Business Statistics (9th ed.)

**Mark L. Berenson,
David M. Levine,
Timothy C. Krehbiel**

Prentice Hall, 2004,
<http://www.prenhall.com>

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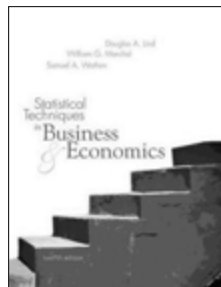
with a Using Statistics example demonstrating how the material presented in the chapter may be used in one of the functional areas of business. These examples relate to the Springfield Herald case that appears at the end of 14/18 chapters, or to one of the new Web cases that is found on the companion Web site. The Web cases provide an opportunity for the students to examine a variety of materials, determine their relevancy, and use the appropriate materials to analyze whether the conclusions presented in the case are justified and supported by the data. The instructional tips and solutions provided for instructors are thorough.

Learning the Basics and Applying the Concepts problems are included for each section. Each chapter concludes with a summary, key terms, and chapter review problems using datasets found on the student CD-ROM in Excel, MINITAB, and SPSS format. Report-writing exercises, Internet exercises, and team projects are included in

these review problems. The text contains a large number of problems including use of data from *Wall Street Journal*, *USA Today*, and *Consumer Reports*.

There is a strong emphasis on the integration of software in the introductory course(s). Exhibits produced using Microsoft Excel, Excel with the PHStat2 add-in (found on the student CD-ROM), MINITAB, and SPSS are found throughout the text. At the end of most chapters, there is an appendix on using software that includes examples and complete directions for using Excel, PHStat, MINITAB, and SPSS.

The PowerPoint slides are excellent and each slide is projected without any animation. The student CD-ROM includes Visual Explorations software that allows students to explore statistical concepts by changing data and watching the effect of the change. In the ninth edition, some topics have been added (index numbers, Six Sigma®, computing descriptive statistics from frequency distributions, counting rules, Wilcoxon signed rank test, and the Friedman test); others have been moved to the accompanying CD-ROM.



Statistical Techniques in Business and Economics (12th ed.)

**Douglas A. Lind,
William G. Marchal,
Samuel A. Wathen**

Irwin/McGraw-Hill,
2005, <http://www.mhhe.com/>

EACH CHAPTER BEGINS

with an Introduction that links the concepts learned in previous chapters to the material in the current chapter. Topical applications and historical comments are found within each chapter in the Statistics in Action segments. Exercises are included after each section and at the end of the chapter. The end-of-chapter exercises include Web exercises and exercises that utilize one of the four large datasets found on the student CD-ROM in Excel, MINITAB, and SPSS format. Self-Review exercises, designed to allow students to monitor their own learning, are interspersed throughout each chapter. The solutions are found at the end of

each chapter. Also included at the end of each chapter are a Chapter Outline and a Pronunciation Key.

Section Reviews cover material from multiple chapters. Each review includes a brief overview, glossary, questions, problems, and several small cases. Key formulas for all chapters are included at the end of the text on a perforated sheet that can easily be removed from the book.

Software Commands, providing directions for using Microsoft Excel, Excel with the MegaStat add-in, and MINITAB, may be found at the end of the chapters. The student CD-ROM includes several basic ScreenCam Tutorials for each of these packages. Also included on the student CD-ROM are PowerPoint presentations, quizzes, data files in Excel and MINITAB format, MegaStat, and Visual Statistics, a set of software programs that provide an interactive, experimental way in which to explore statistics. The PowerPoint slides are heavily animated.

The twelfth edition has been revised in order to provide more emphasis on interpretation. In some cases, calculation examples have been replaced with ones that emphasize interpretation. The ANOVA section, for example, uses a more conceptual approach.

Comparisons

In considering the customer requirements specified earlier, all three textbooks provide the conceptual foundation necessary for success in subsequent courses. All three texts include cases, although the cases found in the Anderson and Berenson texts are both more numerous and more challenging than those found in the Lind text. Only the Berenson text appears to have cases (the Web cases) that require students to sift through material to determine which items are relevant to the case analysis. If our customers desire a focus on analysis and understanding through the use of realistic applications, cases will enable statistics faculty to better provide this coverage.

Students prefer to use real data, and both the Anderson and Berenson texts employ extensive real data in examples and exercises. With respect to the development of computer skills, all three texts provide directions for use of Microsoft Excel and MINITAB software. Only the Berenson text provides coverage of SPSS.

An examination of the chapters on linear regression analysis illustrates the different approaches to software integration used in the three texts. The Lind text uses an approach that emphasizes calculation. Brief directions for using software are provided at the end of the regression chapter, and some screen shots are provided within the chapter to provide students with some familiarity with regression and correlation software output. The Anderson text begins the chapter by providing directions for performing regression analysis without the use of a computer. Computer solutions are introduced just prior to the discussion of residual analysis, and the appendices provide directions for using software and interpreting the output. In contrast, the Berenson text provides software output within the chapter in lieu of presenting calculations. This approach emphasizes interpretation over calculation. The final section

in the chapter provides directions for calculations, and the appendices provide directions for software use. Thus, in selecting a text for use in introductory statistics courses, you must first determine your approach to software integration in statistical analysis.

There are three areas where the texts differ conceptually: (1) decision rules in hypothesis testing, (2) use of standard normal or t -distribution in interval estimation, and (3) tests for the difference between the means of two populations with unknown population standard deviations.

The three texts provide different decision rules for hypothesis testing. The Anderson text states: "Reject H_0 if $p\text{-value} \leq \alpha$ " (p. 346). The Berenson text states, "If the p -value is greater than or equal to α , the null hypothesis is not rejected. If the p -value is less than α , the null hypothesis is rejected (p. 303)." The Lind text states "If the p -

value is smaller than the significance level, H_0 is rejected. If it is larger than the significance level, H_0 is not rejected (p. 328)." The establishment of a common set of decision rules would be helpful.

In interval estimation and hypothesis testing, differentiation of the use of the standard normal distribution or the t -distribution is made according to whether σ is known or unknown, respectively, in both the Anderson and Berenson texts. This differentiation is consistent with computer-based approaches. The Lind text uses Z if σ is known or n is at least 30. When σ is not known and n is small (less than 30), the t distribution is used in the estimation procedure.

Finally, in testing for the difference between two means with unknown population standard deviations, only the Berenson text describes both the pooled-variance t -test for variances that can be assumed equal and the separate variance t -test when the variances cannot be assumed equal. The Anderson text uses the latter test in all cases and the Lind text never mentions the latter test. If variances are, in fact, approximately equal, the pooled-variance t -test is more appropriate. ■

Disclosure: The author has used earlier editions of the Berenson, Levine and Krehbiel text due to its instructor support materials, lack of errors, numerous problems using real data, team projects and cases.

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Table 1: Material coverage by text.