

Preface

Few would deny that the main responsibility for the decision-making process in our schools has been assumed by building and central office administrators and that education leaders are now asking (and expecting) classroom teachers to participate in this decision making as well. For too long, many school leaders have made decisions about instructional leadership by using “intuition” and “shooting from the hip.” All too often, school leaders do not include data collection and data analysis in the decision-making process.

We are realizing that meaningful information can be gained only from a proper analysis of data and that good decisions are based on this thoughtful process of inquiry and analysis. School districts across the nation collect and maintain many forms of educational data (for example, attendance rates, standardized and criterion-referenced test scores); however, most schools use the collection of these data to satisfy administrative requirements rather than to assess and evaluate school improvement. Educators rarely examine these data to assess in a systematic way the quality of teaching and learning in their schools. This book addresses the dire need for an approach to statistical analysis that is related to educational leadership decision-making applications.

In the first edition of *Schools and Data* (2001), I made the statement that “this need will only become greater as the federal government and our state departments of education ask for more accountability from our school leaders.” Here, five years later in 2006, we find that this is exactly what has happened. Though we have made some progress in this regard, the pressure is still on for school leaders to acquire and utilize effective strategies for data collection and analysis. Principals and teachers must possess an understanding and working knowledge of data analysis and ways to use this analysis to improve teaching and learning in the classroom.

Fewer things are more feared than the thought of “statistical analysis.” To most educators, *statistics* means endless calculations and memorization of formulas. Statistics is seen by most as a formal domain of advanced mathematics and is represented by a course or two taught by professors who desire to make the student’s life as painful as possible. Courses in statistical methods are usually taught with formal proofs of mathematical theorems and the derivation of statistical formulas as a main focus.

Is this anxiety and fear due to the fact that statistical analysis requires a level of mathematical knowledge beyond the capabilities of many principals and teachers? If someone has passed a high school course in elementary algebra, he or she has acquired all the knowledge and skills required for an understanding of statistical analysis (Runyan, Haber, & Coleman, 1994). Students report that their fear is mostly related to the fact that statistics has no relevance to solving the many issues in our day-to-day living (Creighton, 1999).

The educator’s fear of statistics probably relates to a variety of factors, but teacher and principal preparation programs must accept that the presentation of statistics in education probably lacks four important components. First, it does not emphasize the relevance of statistics to the day-to-day lives of principals and teachers. Second, it does not fully integrate current technology into the teaching and learning of statistics. Third, few (if any) statistics courses are designed for students enrolled in teacher education or education leadership programs. Fourth, and finally, many statistics courses taught in colleges of education devote a major part of their time to inferential statistics as a tool in conducting research projects and dissertations. Far less time is spent on statistical strategies that might help the principal or teacher improve their skills in problem analysis, program and student evaluation, data-based decision making, and report preparation (McNamara, 1996).

The second edition of *Schools and Data: The Educator’s Guide for Using Data to Improve Decision Making* addresses these four issues. A brief description of each follows.

RELEVANCE OF STATISTICS TO THE LIVES OF PRINCIPALS AND TEACHERS

Traditional courses in statistics result in the frequent student response: “When will I ever use this stuff?” This book provides

examples, data sets, and problems centered on a wide range of real-world data distributions used by principals and teachers in their work in schools. In addition, real-life examples completed by principals and teachers in the field are presented in most chapters.

Integration of Recent Technology Into the Teaching and Learning of Statistics

The teaching of applied educational statistics needs to move away from the common perception of statistics as mathematical theory and closer to teacher and principal preparation programs (McNamara, 1996). The advances in technology and the large selection of user-friendly computer software can now assist us as we make this move toward a more practical and relevant presentation of statistics for educators. Though several good statistical packages exist, two leading statistical packages are mentioned throughout this book: (1) Statistical Package for the Social Sciences (SPSS), and (2) Microsoft Excel. Both are easy-to-use, menu-driven statistical programs applicable for analyzing such data as student standardized test scores, attendance and dropout rates, and college entrance requirements. A “student version” of SPSS costs less than \$100 and is powerful enough to handle any analysis encountered in schools or the university classroom. I include Microsoft Excel because it also is a very powerful software for data analysis and it is likely already to be on your computer or laptop.

Though we agree with the importance of educators’ learning to calculate statistics, the early and regular use of SPSS and/or Excel allows the student and practitioner to spend less time on complex mathematical calculations and more time on statistical selection and interpretation. It is important to state that research and statistics have less to do with the collection and analysis of data, and more to do with the interpretation and meaning of the analysis. Step-by-step procedures are presented in each chapter of this book, accompanied by real-world applications to educators’ problems in the field. The procedures and examples are also available as interactive simulations and demonstrations on the *Schools and Data* Web site, available at: <http://www.schoolsanddata.org>. The data sets presented in the chapters and the Resources at the end of the book are also posted on the Web site and can be easily downloaded for your use.

Statistical Analysis Designed for Educators

This second edition of *Schools and Data* centers on both master's and doctoral-level research and statistics courses taught in the Department of Educational Leadership and the Center for Research and Doctoral Studies in Educational Leadership at Sam Houston State University. Many of the examples included in each chapter are projects and studies conducted by practicing teachers and principals working on master's or doctoral degrees. The data are collected from real classrooms, focusing on student instruction and assessment; attendance, dropout, and graduation rates; college entrance tests; and instructional program evaluations.

Descriptive and Inferential Statistics

First, I want to state that we need to guard against the notion that descriptive data and analysis are less powerful than inferential analysis. Inferential statistics are methods that use sample data to make generalizations about the population. In most cases, we simply want to study the situations in our schools. Rarely do we want to make generalizations about other schools or students. For example, if we are studying the effect of whole language instruction in our fourth grade classrooms, we are not interested in fourth graders across the country—we only want to know what is happening with *our* fourth grade students. Though inferential statistics is a useful tool, descriptive analysis can be just as powerful. Think for a moment about the book written by Jonathan Kozol entitled *Savage Inequalities* (1992). As you know, it is a book about the inequities in our large urban schools. Kozol's research was purely descriptive—he used no complex statistical analysis, he just *described and reported* what he observed in the city schools he wrote about. The point is important here: Kozol's book was of great impact and very influential not only in the realization of our inattention to our urban schools and children, but it also made a great impact on educators and society as a whole and was instrumental in the restructuring of our large urban schools. I suggest that no amount of inferential analysis could have had such a significant effect.

Though inferential statistics are more likely to be used in research studies and dissertations, descriptive statistics are more likely to be used in schools. Descriptive statistics (percentile ranks,

means, median, modes, range, standard deviation) help us *describe* those studied, and inferential statistics use sample data to *estimate* parameters and test hypotheses. In most cases, the educator encounters data in the schools that are related to populations rather than to samples. In other words, data are collected from entire classes or grade levels, entire building populations, or entire district populations. Principals and teachers are not especially interested in generalizing their school data findings to other schools or estimating parameters and testing hypotheses.

Though much of this book's emphasis will be on descriptive data collection and analysis, I include many examples of how the educator can use inferential statistical analysis. But I attempt to shift the use of inferential analysis from the traditional research and dissertation model to one of relevance and applicability to teachers and administrators.

THE SECOND EDITION

Effective Leaders Needed

The challenges we face in schools today are increasing, and never before has the importance of using data and evidence to make decisions about school improvement and increasing student achievement been so crucial. But these challenges have changed somewhat from our challenges of the past decade—new standards, emphasis on new accountability, and the frequent charges from our stakeholders (federal, state, and local) that schools are not performing at high levels. And because these challenges have changed, there is a need to revisit the processes we use in program evaluation and data analysis. This second edition of *Schools and Data* addresses these new challenges and presents new processes for school leaders to provide the leadership necessary for school improvement and increased student learning.

The revisions to the second edition of *Schools and Data* are based on feedback received from school leaders (for example, principals, superintendents, teachers), and university professors and graduate students who use the book in their classes. Specifically, the revisions include a change in the format of the text, the creation of four new chapters, and the inclusions of several new features.

The New Format

Theoretical Framework

Due to the increased focus on standards and accountability, I have designed many of the application activities around the federal legislation No Child Left Behind (NCLB). This legislation serves as a framework for the second edition.

Inclusion of New Statistical Software

Though I continue to use examples and data sets utilizing the Statistical Package for the Social Sciences (SPSS), I parallel SPSS with Microsoft Excel, assuming that many of my readers have easy access to Excel, a very powerful data analysis tool in its own right.

Four New Chapters

New chapters were added for two reasons: (1) important topics were missing from the first edition, and (2) the total of 13 chapters better fits into a traditional semester course, allowing for the study and reflection of one chapter per week.

Chapter 5: Introduction to Regression

As an extension of correlation, regression helps us investigate relationships between variables much further than just determining strength and direction of the relationship. Regression allows us to determine what type of relationship exists and what kinds of predictions we can make from the relationship.

Chapter 11: What If No Mean Scores? The Chi-Square Test for Goodness of Fit

All of the tests presented in the first edition involved numerical scores (for example, test scores) for each individual in the sample. These tests are called *parametric tests* because they all make certain assumptions about our samples—that the distributions are normal (you know, the normal curve) and that there are equal variances among our different groups.

Often (actually very often), school leaders are confronted with situations that do not conform to the assumptions or requirements of parametric tests. For example, let's suppose we are

interested in analyzing the number of students who pass versus the students who fail our state's required assessment. Our students will be really just classified into two categories (pass or fail). A student is either one or the other (kind of a label or category).

Fortunately, there is a hypothesis-testing technique that provides an alternative to parametric tests. This alternative is called a *nonparametric test*—or formally, the chi-square test. There is no need to get technical here (or, as you may recall from my first edition, maybe there is never a need to get technical), but I point out here that the difference between *parametric* and *nonparametric* relates to the type of data we are using. All of the data sets used in the first edition of *Schools and Data* involved numerical scores (interval data). For *nonparametric tests*, on the other hand, our subjects are usually just classified into categories or frequencies (nominal data). Chapter 11 in this new edition covers the chi-square test thoroughly and demonstrates its usefulness in improving schools and student achievement.

Chapter 12: The Other “Q”

Perhaps my friends and colleagues will be surprised to hear me state that few, if any, evaluations and assessments in our schools would be complete without some qualitative information. For example, the qualitative technique of “observation” is essential for just about every evaluation we conduct in our schools—observing student behavior, observing teacher performance, and many others. Another qualitative technique, the “interview,” is useful when greater depth in information is needed. When we sit down with all the fifth grade teachers to discuss programmatic issues, we really are utilizing a qualitative technique called “focus groups.” Valuable data comes from these and other qualitative strategies. Chapter 12 in this second edition presents the importance of adding qualitative methods to our use of data to improve decision making in our schools.

Chapter 13: Putting It All Together: An Evidence-Based Practice Field

Fortunately, the recent emphasis on accountability requires us to look more closely at existing data as we make our decisions toward school improvement. *Unfortunately*, and cause for alarm, is that in our haste to collect and analyze existing data, we have neglected to investigate beyond existing data to consider “below

the surface” data. The cause for alarm relates to the fact that many of our special needs students (for example, limited-English speakers, students of color, students with disabilities) are not served well when we only examine surface data. Chapter 13 of the second edition introduces the practice of using *evidence* (below the surface) as opposed to just considering *existing data* (surface).

New End-of-the-Chapter Features

New Application Activities

Chapters 1–12 conclude with updated and relevant opportunities to practice application. The activities are a blend of elementary, middle, and high school examples and scenarios.

NCLB Application Activities

Chapters 3–12 each have a specific activity related to the goals and requirements of the No Child Left Behind legislation.

The *Schools and Data* Companion Web Site

The author has created a special Web site, available at: <http://www.schoolsanddata.org>, to provide additional information and that contains activities paralleling the individual chapters of the second edition of *Schools and Data*. For example, school leaders and graduate students can view interactive simulations and demonstrations that include audio, animation, and interactions. The Web site also includes sample syllabi for university professors in principal preparation programs. These simulations are in both SPSS and Excel formats. Most important, this site has a question-and-answer forum that allows principals, teachers, students, and professors to communicate directly with the author. In addition, PowerPoint presentations have been developed on key concepts of each chapter containing the tables and figures from that chapter. These syllabi, presentations, simulations, and demonstrations are free to use and can be easily downloaded for your work in schools and classrooms.