Introduction

This book is for classroom teachers, school and district administrators, pre-service teacher candidates, school psychologists, and other educators who are tasked with using data to inform their work and practice. It is for undergraduates, graduate students in teaching and administration programs, and for continuing education courses. We highlight educational psychology because the book series of which this volume is a part is sponsored by Division 15, Educational Psychology, of the American Psychological Association. The book series pairs a researcher and a practitioner to deliver a volume that is appropriate for practice, but grounded in theory and research. Thus, there is an emphasis on educational psychology, but the book is intended to be much broader than just the one discipline. It crosses many courses and topics covered in schools of education.

How Does Educational Psychology Fit Into the Mix?

Data-driven decision making is a broad and generic tool, which encompasses many topics that are incorporated into educational psychology. It has also been referred to as data informed and data based. We prefer data driven but the others work as well. It can be defined as the collection, examination, analysis, interpretation, and application of data to inform instruction, administration, policy, and other decisions and practice. Data-driven decision making is more than numbers.

It is about transforming the quantitative and qualitative data into actionable knowledge. It is generic in the sense that data-driven decision making crosses content areas and can be applied in many settings, from social studies teachers analyzing how students understand recurring theories in history to physical education teachers examining batting averages. It is comprised of a composite of skills and knowledge that typically would be accumulated through a variety of courses and educational experiences. These might include assessment, statistics, instructional psychology, pedagogy, differential psychology, and classroom management, among others. But no one research area, professional development workshop, or college course deals specifically with how educators transform data into actionable knowledge, whether in a classroom or in a school or central office.

Training or courses in assessment help educators to understand the general principles of measurement and how to construct classroom tests or interpret standardized results. Statistics courses for educators may help to analyze numbers at an elementary level, but they are usually quite abstract and fail to deal with the practical issues around data analysis. Instructional psychology deals with the theory of instruction while pedagogical principles focus on the actual practice of teaching. Differential psychology deals with the theory of how different individuals function cognitively and affectively, the foundation of differentiated instruction. However, teachers and administrators must ultimately plan and use feedback to meet students' varied readiness levels. Classroom management approaches may help educators translate some of the principles of differential psychology into practice through the concepts of whole class, small group, and individualized instruction. Each area from educational psychology has its own skills and knowledge to contribute. Data-driven decision making and data literacy skills are at the intersection of all of these areas and thus, its emergence is an important topic for educational psychology and shares the goal of improving student learning. We therefore hope that this book will fill a void

not only in educational coursework but also in professional development and policy making.

WHY DO WE NEED ANOTHER BOOK ON THE TOPIC?

Books, journals, and online resources have begun to appear about data-driven decision making over the past decade. Among the books, some are for research audiences, while others are geared solely to policy makers or to practitioners. Many of the books for practitioners are written more for administrators than for teachers. Ironically, some are written as if they were elementary statistics texts, with little or no discussion of theory or practical implementation issues. Some of the books are how-to manuals for using data. Let us be clear, however, that this is not a how-to book. There are books that are quite excellent to which both of us turn often as resources. For example, for theory, we turn to Mandinach and Honey (2008), a compendium of chapters on how data are being used. We also turn to Herman and Haertel (2005) for information about data and assessment and Moss (2007) for excellent chapters about data use. We turn to Love, Stiles, Mundry, and DiRanna (2008) to help us understand how to teach educators to integrate data use into their practice through the development of data teams and data coaches. But few adopt the integrated perspective that we offer in this book. It is our goal here to integrate the research and theory with the realities of practice, recognizing that educational settings are not pristine laboratories and that educators need guidance with flexibility that can be adapted to their own circumstances.

Among the journals, most are geared toward research audiences. Wayman (2005b, 2006) edited two special issues focused on research on data-driven decision making. Few journals have been directed to practitioners. One notable exception was *Educational Leadership,* which published a special issue in 2008/2009 titled *Data: Now What?* (Association for

Supervision and Curriculum Development, 2008/2009). Online resources, however, are much more focused on helping practitioners to understand and use data. For example, the Doing What Works website (see http://dww.ed.gov/Data-Driven-Instructional-Decision-Making/topic/index.cfm?T_ ID=30) provides resources, materials, references, examples of practice, and interviews with practitioners and data experts to assist educators in using data in their work.

An example of quality alternative sources for information on data-driven decision making is the IES Practice Guide on data-driven decision making (Hamilton, Halverson, Jackson, Mandinach, Supovitz, & Wayman, 2009). This document is not a book but a resource report in which researchers and practitioners examined existing evidence on the topic, rated the studies for their level of rigor, and from studies deemed acceptable, excerpted recommendations and action steps for educators to take when using achievement data to make instructional decisions. The guide can be a valuable resource for practitioners, but it has some limitations. First, its content is limited by the criteria used by the What Works Clearinghouse (WWC; see http://ies.ed.gov/ncee/wwc/reports/) in rating research for rigor and therefore credibility. Thus the Practice Guide contains only rigorous research and fails to report on many studies, particularly those that are formative, case studies, and implementation work from which much useful and relevant lessons can be drawn. This is not to say that the research reported is not informative. It is. But it simply does not go far enough in our opinion, and much work that has practical implications for educators may have been omitted.

Second, the Practice Guide was purposefully limited to data-driven decision making in the context of achievement data. The field is much broader, so this volume, although drawing some content necessarily from the report, is much more inclusive and comprehensive. It relies on vetted research as well as implementation and formative studies that do not rise to the level of the WWC criteria, as well as targeted scenarios from which educators can draw practical implications.

It describes the use of many types of data, not just standardized achievement test results.

Third, the Practice Guide focuses primarily on the classroom teacher and, to a lesser degree, the school. This volume is also more inclusive in that regard. Its objective is to reach teachers, instructional leaders, school administrators, and central administrators, all of whom use data and have different data needs. It also can be used by professional development providers. The volume therefore recognizes the need for institutionalization, the enculturation of data, and a holistic transformation to a systemic data culture.

Why These Authors?

Although our backgrounds are very different, they are completely complementary when it comes to the topic of data-driven decision making. Both of us have a passion for data-driven decision making and have a firm belief that, as a tool, the use of data can effectively impact educational practice if it is the right data for the appropriate purposes.

Ellen is an educational psychologist who approaches data-driven decision making as a researcher and from a systemic perspective. That is, the use of data forms a feedback loop that enables individuals and organizations to engage in an examination of practices through a process of continuous improvement. She has studied and collaborated with many districts and states across the country, examining how teachers and administrators use data, the opportunities educators see in data use, the challenges to data use, and the systemic nature of creating data cultures within schools, districts, and state education agencies (SEAs). She has been an observer of data use, trying to understand it theoretically, objectively, and practically.

Sharnell, in contrast, has lived data-driven decision making through her various roles in one of the largest school districts in the country. She has been a classroom teacher who used data to inform her instructional practices, well before

data-driven decision making became a common term in educational circles. She helped to create a data culture in her classrooms and schools. She also has been a high-level central administrator, among whose responsibilities were to identify technological solutions to support data-driven decision making, to train teachers and administrators in data analysis, and to work directly with educators throughout the district to help them adopt, implement, and infuse data-driven practices in their daily work. She knows data from an insider's practical perspective.

Of course there are other researchers and practitioners who have worked in the area of data-driven decision making and who have much to say about the field. We know many of the researchers and have great respect for their work, which has informed our thinking. We see our research and practice as having taken parallel tracks that create a complementary, coherent, and realistic perspective of the field. Our paths have continued to cross at professional meetings, culminating as panelists on the IES Practice Guide on data-driven decision making (Hamilton et al., 2009). It was clear that the document as we mentioned above, although providing an evidence-based foundation and a guide for educators, did not go far enough to deal with the realities and practicalities of enculturating data into educational practice. Thus, helping educators to use data effectively by linking theory, research, and practice serves as the objective and foundation for this volume. We hope we have succeeded.

OUTLINE FOR THE BOOK

In the following chapters, we will address many of the key components that research has indicated are important for the effective use of data. Research only tells part of the story, because there are still aspects of data-driven decision making that have not yet been submitted to close examination. For example, we are making a logical assumption that the use of data will help students to learn and achieve better than if

teachers simply used anecdotes or gut feelings, based on years of experience. The logic model that underlies this assumption is that training teachers and having them use data will somehow change their instructional practice, and those changes then will translate into improved student performance. This model, heretofore, has not been tested empirically. That said, the assumption is not baseless. Our experience leads us to believe that the logic model, indeed, is grounded in reality. But here and elsewhere, because of a lack of credible evidence in a rapidly growing field, we indeed are using anecdotes, observations, years of experience, and yes, gut feelings. Guilty as charged.

Thus, the following chapters will integrate empirical results with experiences and observations of data at work in real settings. How generalizable are these experiences? Sharnell's experience is grounded in her service as a teacher and administrator in the country's third largest school district. Her second career as a consultant on data-driven practices has taken her to many schools and districts, large and small, affluent and struggling, and urban, suburban, and rural. Ellen's experience has been through various research projects that have taken her to many states and districts across the country. She has conducted research in three of the largest districts in the country, but she has also studied data use in some of the most rural districts. She has examined data-driven decision making in the classroom and at the school, district, and state levels.

In Chapter 1 we present a context for this book. We describe why the time is ripe for data-driven decision making, providing an historical context into which we frame our remarks. We address why the topic of data use is important and why now.

Chapter 2 presents the research that informs the area of data-driven decision making. We share salient issues that inform the topic, setting the stage for the remainder of the chapters. First we describe the foundations of data-driven decision making, including data use, theoretical frameworks, and types of data. We then present the components of

data-driven decision making, such as the vision for data use, data cultures, the technology to support data use, and the need to build human capacity through professional development to increase educators' skills and knowledge.

Chapters 3 and 4 focus on two of the most essential components of data-driven decision making: the technological infrastructure and human capacity. In Chapter 3, we discuss the kinds of technology-based tools that can be used to support data-driven decision making as well as technologies that may be on the horizon. The chapter also takes into consideration district size as it influences the kinds of tools that districts are able to acquire and use. Small or poorer districts are not likely to be able to afford or accommodate student information systems or data warehouses. Larger or more affluent districts may have these and other kinds of technologies that will support data. In the chapter we will discuss some of the alternative solutions and emerging technologies, recognizing the challenges of staying current and obsolescence.

Chapter 4 focuses on human capacity issues. We describe the kinds of skills and knowledge teachers and administrators are likely to need and discuss what we call pedagogical data literacy. The chapter emphasizes the need for continuous capacity building, rather than professional development delivered in a single, isolated workshop. It is grounded in the recommendations of the National Council for Accreditation of Teacher Education (NCATE) Blue Ribbon Panel (2010) about the future of teacher preparation using a clinical model. The chapter reflects two major policies: Race to the Top (U.S. Department of Education, 2009) and the four pillars of the American Recovery and Reinvestment Act (ARRA, 2009).

Chapters 5, 6, and 7 describe the fundamentals of data use. In Chapter 5, we focus on the continuous management that is needed for schoolwide or districtwide data use. For schools, this means the creation of data teams or professional learning communities around data. It also means appointing a data coach, facilitator, or champion who can lead the data inquiry process. This individual may be an experienced teacher,

instructional leader, or building administrator. Schoolwide data use also entails the creation of cultures led by the data coaches and data teams but comprised of educators throughout the school. At the district level, there also is a need to create a data culture, but it is comprised of a different cohort of key, data-informed administrators, and it should be guided by an explicit vision for data use from senior administrators.

Chapter 6 focuses on how to use data. In this chapter we describe the kinds of data that are available to teachers, schools, and districts. It reinforces the need for data teams and a process of collaborative inquiry while addressing the fundamentals of how teachers use data and emphasizing the need for strategic planning. We then introduce scenarios of fictitious schools that play out the themes carried throughout the book. These schools provide examples of how data can be used or misused and the many components that are involved in data-driven decision making. We conclude with some challenges and opportunities.

Chapter 7 follows directly from the content of the previous chapter, describing class management issues that ensue from data-driven decision making. We focus on the principles of differentiated instruction. The chapter provides examples of small-group instruction as well as instruction for individual students.

The final chapter integrates lessons from the entire volume. The chapter provides numerous examples, both positive and negative, of how data are being used and the issues around data use. We call them the CHOPS[1]—the challenges to and the opportunities for data-driven decision making. The chapter briefly discusses the change management process with schools and districts depicted as learning organizations (Senge, 1990) and data facilitating that change process. We recognize and note that the process of using data effectively does not come without a price. It is not easy and is both labor-intensive and expensive. There are important opportunities to be gained from creating data cultures, but there are also challenges to creating such change. Change management requires

a philosophical paradigm shift and a change in mindset. We recognize that old habits are not easily extinguished. We also recognize that implementing data-driven decision making is not a panacea or a one-size-fits-all solution. There must be flexible adaptations, contingent upon the specific circumstances of each classroom, school, and district. We conclude on a positive note reiterating the importance of the opportunities inherent in data-driven decision making, not just the challenges to its implementation.