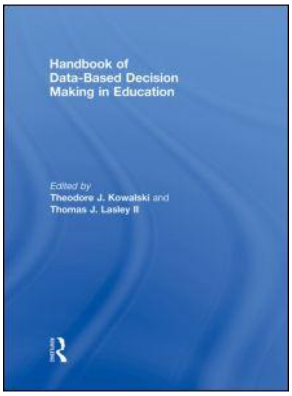


# Handbook of Data-Based Decision Making in Education

Theodore J. Kowalski, Thomas J. Lasley

## Using Data to Make Critical Choices

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*Edited by*

**Theodore J. Kowalski** and
**Thomas J. Lasley II**

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# Using Data to Make Critical Choices

*Thomas J. Lasley II*
University of Dayton

The use of data to make decisions is not new. Historically, practicing professionals (lawyers, doctors) have used data to make decisions to benefit the clients they serve. Similarly, scholars (academics) have always been devoted to the use of data and information in ways that further professional understandings and expand the professional literature. More recently educational professionals (teachers and school administrators) have been using varied databases to shape educational practices in order to understand and enhance student and school performance.

What is changing, and changing rapidly for all educators in general and classroom practitioners in particular is the access to and use of data. The No Child Left Behind world, whether good or bad in terms of its demands on student achievement, is clearly influencing how teachers think about and use data.

This chapter focuses on the use of varied databases to make program and instructional decisions. Such decision making can be deceptively complex. How does a teacher sort through the masses of available data and information in order to make a thoughtful decision? And, once a decision has been made, how do teachers implement those decisions? This chapter focuses on questions around the use of data by teachers and the relative success of teachers in using data in educationally efficacious ways. More specifically, why do some teachers become "high performers" in using data to make decisions about classroom practices while others, seemingly, evidence low performance? What steps are taken by high performers to ensure that the decisions they do make are effective in achieving defined outcomes?

The decision-making process starts with understanding the context and the data being used. An aphorism in philosophy suggests, if you grant someone the first premise, anything can be proven. In essence, where one starts will influence the conclusions that are reached. For decision making the consequences seem clear. If teachers limit (or circumscribe) the data being used, they should not be surprised by the conclusions that they subsequently reach.

## Data Sources and Interpretation

A simple Internet query on almost any topic will yield pages of information and facts that potentially can be used to make decisions about practices, problems or issues.

The practices or problems may be highly conceptual and theoretical, with scholarly implications, or largely practical in nature, with direct applications to one's personal life (e.g., how to purchase a car online) or a teacher's classroom practice (e.g., vivid pictorial accounts of a famous battle).

Scholars in almost all disciplinary fields use data to reach conclusions or produce recommendations that in turn become the foundations for public policy. Inevitably, those conclusions and recommendations are shaped by the ideological biases or intellectual dispositions of those interpreting the data. Though this chapter will not focus on how personal subjectivity influences the policy or practice decisions an individual makes, it is critical to understand that the world view any scholar or professional practitioner possesses influences the conclusions ultimately reached. As an example, many social reformers concerned with socioeconomic inequities between Blacks and Whites have argued that the civil rights legislation and Great Society programs of the 1960s are the reasons why Blacks in America have become more socioeconomically competitive. In 1940, 87% of all Black families lived in poverty; in 1970, that figure was 30%, and with the "help" of affirmative action programs, so the social reform argument goes, that figure dropped even further (Sowell, 2005). The conclusion seems logical: The social reform programs of the 1960s impacted positively the socioeconomic circumstances of Blacks and, as a consequence, persons of color became more economically competitive. Many used those data about poverty and the associated conclusions to argue for more social reform-type programs because they believed certain social policies needed to be instituted by the federal government given the data that were available to policy makers.

Sowell (2005), however, "mined" some of the same data and reached a different conclusion. Indeed, Sowell observed that "the poverty rate among blacks had been nearly cut in half [*before*] either the civil rights revolution or the Great Society programs began in the 1960s" (p. 24). Sowell's "answer" for the poverty rate drop was education and access to it. Sowell writes:

> Similarly, despite a widespread tendency to see the rise of blacks out of poverty as due to the civil rights movement and government social programs of the 1960s, in reality the rise of blacks out of poverty was greater in the two decades *preceding* 1960 than in the decades that followed. Education was a major factor in this as well. As of 1940, non-white males averaged just 5.4 years of schooling, compared to 8.7 for white males. Over the next two decades, the absolute amount of education increased for both—and the gap between them narrowed. In 1940, the difference in schooling between black and white young adult males, aged 25 to 29, was four years but, by 1960, that had shrunk to less than two years. Because this was an era of massive black migration out of the South, this quantitative narrowing of the gap in schooling may well have been accompanied by a qualitative improvement, as many blacks left behind the low-quality schools in the Jim Crow South. (p. 241)

Clearly, one problem in using data to make decisions is decision-maker objectivity. Just as it is a hopeless task to attempt to eliminate biases from the research process itself, it is also virtually impossible to eradicate the ideological and dispositional biases of any individual who is reading research for the purpose of making a decision (Kaplan, 1964). The less inclined the decision maker is to understand and explore personal values and biases, the less likely it is that the decisions reached will be efficacious. The key is to make explicit what those biases are and to fully understand the conceptual or empirical basis that underpins the research product.

But, even when decision-maker values and biases do not play a significant role in policy and practice decisions, access to good data can still make decision making difficult for professionals and more significantly for the clients being served. Educators are just beginning to deal with this reality. Educational practices have been ideologically driven for decades. Few teachers or researchers could prove that their methods were "best practices" for students, so they simply argued for others to embrace advocated approaches based on theoretical arguments and selected anecdotal evidence. The method de jure was often a result of what conference or professional meeting a teacher or principal had just attended, not on sound evidence about what educational practice really worked. Educators are not the only ones who have struggled with knowing how to access and use good data to ground sound practice, and they are not the only professionals who have had to ascertain if practices "advertised" as best for clients truly represented that in reality. To illustrate this fact, consider Gawande's (2004) description of cystic fibrosis (CF) medical practices.

In particular, Gawande (2004) describes the plight of two parents, Honor and Don Page, who have a child with CF. The Pages, like all parents, wanted the best treatment possible for their child and began a search for appropriate medical care. They were making a critical life and death decision: What hospital or team of doctors could extend the life of their child? Using the information that they as parents had available, the Pages selected Cincinnati Children's Hospital, which, putatively, was known as one of the most respected CF facilities in the country.

The reality, as Gawande (2004) suggests, was something quite different from what the Pages concluded:

> The one thing that the [Cincinnati] clinicians failed to tell them [the Pages], however, was that Cincinnati Children's was not, as the Pages supposed, among the country's best centers for children with cystic fibrosis. According to data from that year, it was, at best, an average program. This was no small matter. In 1997, patients at an average center were living to be just over thirty years old; patients at the top center typically lived to be forty-six. By some measures, Cincinnati was well below average. The best predictor of a CF patient's life expectancy is his or her lung function. At Cincinnati, lung function for patients under the age of twelve—children like Annie [the Pages' daughter]—was in the bottom twenty-five per cent of the country's CF patients. And the doctors there knew it. (p. 2)

The Pages' biases did not mitigate the quality of the decision they were making; rather, they simply lacked key data (in this case, patient lung function statistics) necessary to determine where they could receive the best care for their child. Patient lung function data would have pointed the Pages to seek treatment at the truly exceptional Minneapolis Cystic Fibrosis Center, Fairview-University Children's Hospital, whose programs in 1997 were adding up to 16 years of life for patients. Not an insignificant time period for anyone, but especially so for young people with CF who at best might live to their mid-40s.

Interestingly, when Gawande visited the best CF center in the country, the Minneapolis Cystic Fibrosis Center, he uncovered a significant variable in the data-driven decision-making process. Physicians there were using data and information that extended beyond extant research *and* informed professional judgments to reach conclusions about professional practice. Gawande implicitly concludes that an over-reliance on one CF data source (e.g., the research that currently exists) and an unwillingness to continually explore a problem results all too frequently in an ineffectual decision. The Minneapolis Cystic Fibrosis Center's high success rate could be traced back to the efforts of an aging, indefatigable doctor, Warren Warwick, who argued for "an expiration date" on research findings and who evidenced aggressiveness, ingenuity, and intuitiveness in solving CF problems. Despite his years of successful experience as a clinician, Warwick was not ideologically bound to one way of treating CF patients or interpreting data. His approach was to employ continual data collection to intentionally move beyond the traditional evidence base accessed by most physicians. By expanding the type of data he collected, Warwick better equipped himself to make the best decisions on behalf of his CF clients.

In summary, good CF treatment data-based decisions were being made under three conditions, and those same three conditions pertain to decision making by teachers and administrators:

1. The decision maker (teacher) possesses a clear awareness of personal biases.
2. The decision maker (teacher) has access to good data, understands the appropriate "timeliness" of such data for problems of practice, and has a reasonable amount of time to examine data sources.
3. The decision maker (teacher) is never satisfied with the data that currently exist and assiduously and thoughtfully looks for other types of qualitative and quantitative data to support decisions made on behalf of clients (students).

## The Data-Driven Decision-Making Bell Curve

In every profession there is a performance bell curve representing a few top performers, a relatively larger number of average performers, and then a smaller (hopefully) group of under-performers. Though everyone likes to believe that his or her doctor or lawyer or school teacher is in the top performance category, the reality is that many clients ultimately select professionals who are simply average—less skilled than the best diagnosticians and decision makers in the field. The differences between average and best may appear subtle, but the end results in critical services like heart surgery or elementary reading instruction can have life-altering implications. Gawande observes:

> In ordinary hernia operations, the chances of recurrence are one in ten for surgeons at the unhappy end of the spectrum, one in twenty for those in the middle majority, and under one in five hundred for a handful. A Scottish study of patients with treatable colon cancer found that the ten-year survival rate ranged from a high of sixty-three per cent to a low of twenty-per cent, depending on the surgeon. For heart bypass patients, even at hospitals with a good volume of experience, risk-adjusted death rates in New York vary from five per cent to under one per cent—and only a very few hospitals are down near the one-per-cent mortality rate. (p. 2)

Educators are just beginning to understand the qualitative difference that the best teachers can make in classrooms. Coleman et al. (1966) asserted that schools contributed in minimal ways to student achievement; the real influence on student achievement was the family. This orientation persisted through the mid-1990s, with proponents arguing that parents (and parental socioeconomic status) were the primary determiners of student performance. Teachers were considered secondary in terms of enhancing student academic growth. With the value-added research of the past decade, that priority ordering has changed. Educators now proceed from the understanding that effective teachers can "trump" parents in terms of fostering and influencing student academic learning. Nye, Konstantopoulos, and Hedges (2004) reported that:

> These findings would suggest that the difference in achievement gains between having a 25th percentile teacher (a not so effective teacher) and a 75th percentile teacher (an effective teacher) is over one-third of a standard deviation (0.35) in reading and almost half a standard deviation (0.48) in mathematics. Similarly, the difference in achievement gains between having a 50th percentile teacher (an average teacher) and a 90th percentile teacher (a very effective teacher) is about one-third of a standard deviation (0.33) in reading and somewhat smaller than half a standard deviation (0.46) in mathematics. . . . These effects are certainly large enough effects to have policy significance. (p. 253)

Nye and colleagues confirm what many other value-added researchers document: better teachers make a bigger academic difference. In essence, their work confirms the existence of a performance bell curve for schools and for teachers just as is found in other professions. And, as in other fields, where an educator lands on that bell curve depends in part on how effectively he or she makes decisions using data.

## Professional Decision-Making Performance Levels

One of the critical dynamics is *how* professionals use data to make decisions. At each level of performance, is it possible to see what is or is not occurring that separates excellence from mediocrity? For the purposes of this chapter, only two groups, high performers and low performers, will be considered relative to their uses of data to make decisions about practice. (See Table 15.1.)

| *Characteristics (Low Performers)* | *Characteristics (High Performers)* |
|---|---|
| Use learning patterns for *some* students to generalize principles of instruction for *all* students | Understand that patterns for some students are not mandates for all learners |
| Seek "one way" of approaching students even when conflicting data are evidenced | Understand "exceptions" and can appreciate how to use opposing ideas to deal with exceptions |
| Use personal biases in ways that limit instructional options | Never allow biases to limit the options they explore |
| Possess a narrow view of what constitutes "data" | Look for data everywhere from a variety of formal and informal sources |
| Unwilling to try new teaching methods that are unfamiliar and feel uncomfortable | Willing to try new teaching methods, even if they are unfamiliar or initially uncomfortable |

**Table 15.1** Low and high performers data-based decision-maker bell curve.

High performers use data with an openness to significant data anomalies. That is, they know what they believe but are not bound by it, and they look for relevant data but understand that "patterns in findings" do not mandate action. Exceptions to the norm are matters of personal and professional interest. High performers understand how to use data in ways that match client or situational needs. They may be ideological, but they are still able to see and interpret exceptions in ways that serve the best interests of the clients (or students) they serve.

Collins (2001) captures this characteristic best: The high performers "lead with questions, not answers" (p. 74). Those questions drive them in insatiable ways to find answers to complex problems of practice. True: high performers have biases. Equally true: they never allow those biases to keep them from searching for or using data that might cause professional discomfort. Collins describes the disposition toward inquisitiveness of great leaders (and decision makers) by describing from business the behaviors of Alan Wurtzel (creator of Circuit City):

> When Alan Wurtzel started the long traverse from near bankruptcy to these stellar results, he began with a remarkable answer to the question of where to take the company: *I don't know*. Unlike [other] leaders, Wurtzel resisted the urge to walk in with "the answer." Instead, once he put the right people on the bus, he began not with answers, but with *questions*. (p. 74)

Interestingly, teachers who are high performers evidence this same drive to get things right and to do so in ways that ensure success for all students. Haberman (1995) called these high performers "star teachers." Their "star power" was reflected in how they treated the teaching act as a problem-solving activity that caused them to look for answers with persistence and creativity.

Haberman's "stars" know that no one answer is sufficient because no two children are alike. In Haberman's words: "[Stars] not only listen, they hear. They not only hear, they seek to understand. They regard listening to children, parents, or anyone involved in the school community as a potential source of useful information" (p. 93).

The high-performing star teachers look for information everywhere as they structure the classroom environment. They want to know test scores, but they understand that such scores (whether from standardized or teacher-made tests) are only part of the educational practice equation. The pedagogical stars, those who are able to make thoughtful and effective decisions, are individuals who know that data are, quite simply, everywhere. They look at multiple sources (both formal and informal) as they make instructional decisions, and they do so in ways that foster emotionally and academically healthy classrooms.

Low performers frequently do not use or do not have access to data about the systems within which they work. Other low performers do have access to data, but they use them without regard to context factors. Many low or under-performers simply do not want the facts or data to confuse what they perceive as the answer. Consider this example from the corporate world. Collins (2001) describes the tendency in the decision making of Roy Ash (CEO of Addressograph), who possessed a plan for growth but failed to consider all the different types of data that would allow him to gauge its effectiveness. Collins notes:

> Ash set forth a vision to dominate the likes of IBM, Xerox, and Kodak in the emerging field of office automation—a bold plan for a company that had previously only dominated the envelope-address-duplication business. There is nothing wrong with a bold vision, but Ash became so wedded to his quixotic quest that, according to *Business Week*, he refused to confront the mounting evidence that his plan was doomed to fail and might take down the rest of the company with it. He insisted on milking cash from profitable arenas, eroding the core business while throwing money after a gambit that had little chance of success.
>
> Later, after Ash was thrown out of office and the company had filed for bankruptcy (from which it did later emerge), he still refused to confront reality, saying: "We lost some battles, but we were winning the war." But Addressograph was not even close to winning the war, and people throughout the company knew it at the time. Yet the truth went unheard until it was too late. In fact, many of Addressograph's key people bailed out of the company, dispirited by their inability to get top management to deal with the facts. (pp. 70–71)

Low-performing teachers evidence the "Ash" tendency. For whatever reasons, they are unable (or unwilling) to appreciate the complexity of the classroom environment. Some fail to understand the different ways in which children and young people learn; others are steadfastly singular in how they teach content. All children, regardless of their socioeconomic context, are mistakenly assumed to learn content one way, and many low performing teachers justify that "one way" as being well grounded on the extant research (e.g., direct instruction).

Those low performers fail to appreciate the intuitive aspects of the decision-making process. Because they possess "the answers," they are blind to all the other facts confronting them about the students they teach. That blindness has significant social and academic consequences, most importantly students who fail to reach their potential by dropping out of school, either physically or psychologically.

The blindness to multiple data sources may be even more pronounced in many urban school districts where an acute focus exists on alignment issues (standards with instruction, instruction with assessment) and where teachers often find themselves "encouraged" to use highly scripted approaches to content delivery. Hess (2005) and others argue eloquently for aligning the systems within urban schools to ensure enhanced student opportunities for success. They point to examples of where alignment has occurred, such as San Diego City Schools, and describe the imperative of "common strategies" in order for students to truly reach their potential. Though low performing schools (and teachers) may benefit from enhanced uniformity and alignment, it is imperative that reformers do not lose sight of the fact that the drive for consistency must never compromise teachers' focus on bringing together the art and science of teaching. Such a compromise will deaden the learning environment of the school (Kozol, 2005).

The ability to appropriately blend the art and science of teaching separates the high performers from their low-performing colleagues. Low performers tend to rely too exclusively on their intuition or too narrowly on one real or imagined scientifically based approach. Marzano (2007) captures the essence of this balancing act for making decisions in the classroom:

> In short, research will never be able to identify instructional strategies that work with every student in every class. The best research can do is tell us which strategies have a good chance (i.e., high probability) of working well with students. Individual classroom teachers must determine which strategies to employ with the right students at the right time. (p. 5)

### *Steps in the Decision-Making Process*

If, then, high-performing teachers and principals use data and draw those data from multiple external and personal sources, what process do they (or should they) follow in arriving at best practice answers? The steps outlined below are not a prescription for dealing with the multiple routine decisions that are made daily by classroom practitioners. Instead, they should be considered as a process that can be used in addressing more serious problems of practice such as determining the most effective reading approach to use with a particular student or crafting educational practices that will specifically address school drop-out problems.

*Step 1: Articulate the Problem or Question* Without a clear sense of what a problem is, it is quite literally impossible to move through the decision-making process in a thoughtful manner. Teachers and administrators need to begin by isolating the core problem to be solved *and* identifying the associated questions that need to be answered. For example:

*Problem*: An achievement gap exists between White and Black students at the middle grade levels in X urban school district.

*Questions*:

1. What is the magnitude of the achievement gap for the different schools within the district?
2. Do any "pockets of excellence" appear within the district? In other words, are some schools and teachers effectively reducing the gap?
3. What types of professional development might be instituted to address the achievement gap problem? What practices have worked in other districts to reduce the gap, and how can those methods be adapted to meet local needs?

Notice that in answering the questions the decision maker is doing more than simply collecting a list of practices used by other school districts. The focus is on what practices appear to be working in other districts to reduce the achievement gap and on how best to transport successful practices from another district to one's own situation.

*Step 2: Identify What "Model" Will be Used to Answer the Questions and Address the Problem* Some problems require reliance on more limited amounts of data because they are relatively simple or they require an almost immediate response. Others are more complex and entail (and provide for) the involvement of more personnel and access to more varied data. Ikemoto and Marsh (2007) describe four different types of database usage models:

*Basic*: Involves limited database usage and a relatively simple decision-making process (e.g., a single teacher or administrator decides what is best given a particular circumstance).

*Analysis-focused*: Involves limited database usage but requires a much more complex set of dynamics to make the decision (e.g., may involve a team of individuals who must reach agreement of what approach to use). According to Ikemoto and Marsh (2007), the decisions emerging from analysis-focused approaches "were less likely to take advantage of expert knowledge, empirical evidence, and sophisticated analysis techniques to interpret and explain the data" (p. 114). In essence, those making the decision rely on one type of data (e.g., test data) to make decisions even though they might be very inclusive of experts and others in terms of acting on the data.

*Data-focused*: Involves the use of complex databases, but the decisions reached tend to be time specific (i.e., occur at one point in time). Those who use this approach tend not to access expert opinion or to draw on the available empirical research. They tend to access lots of data but, regrettably, engage in a simpler, less sophisticated analysis of the data utilized.

*Inquiry-focused*: By far the most time-intensive and in-depth approach, the inquiry-focused model brings together a wide variety of stakeholders who, through both formal and informal meetings, draw on "multiple types and sources of data, [engage] in a collective effort to examine evidence, and [consider] expertise as part of an ongoing process of improvement" (Ikemoto & Marsh, 2007, p. 119).

Ikemoto and Marsh (2007) assert that the type of model used is typically dictated by factors such as accessibility (i.e., are multiple data sources actually available?) and staff capacity (i.e., do faculty members possess the requisite expertise to either interpret the data they have access to or to formulate and answer the questions that are essential for enhanced practice?). In their words, with inquiry-focused decision making "educators drew on multiple types and sources of data, engaged in a collective effort to examine evidence, and considered expertise as part of an on-going process of improvement" (p. 119).

In essence, teachers and administrators need to be able to identify salient problems, identify relevant questions vis-à-vis those problems, and then use an appropriate decision-making model. Though, in the ideal, inquiry-focused models would appear most desirable, in reality they may often be untenable because they require too much time or faculty expertise (see, for example, Jerald, 2008).

Basic decision-making models often evolve solely out of immediate practical considerations (e.g., what is possible given obvious extant resources or the time available to make a decision). Unfortunately, reliance on such approaches may also result in faulty or undesirable practices. When too few data sources are accessed, when data sources are misinterpreted, or when findings are not adequately vetted by knowledgeable persons, the conclusions reached are either spurious or intervention steps that may not be appropriately implemented. Smith (2008) notes:

> In the past three years, the idea of using data to help improve instruction has caught on like wildfire in the United States. Unfortunately, many schools and districts do not appreciate the complexity of the process: Teachers must have effective and easy-to-use measurement instruments, they must have the knowledge to interpret the instruments, and then they must understand how to alter their instruction to respond to the diagnostic information the instruments provide. In many districts, none of the steps is successfully implemented. (p. 379)

## Data-Based Decision Making: Mitigating Factors to Taking the Steps

Teachers and administrators are making decisions each and every day. They are forced by their respective roles to be decision makers. As discussed previously, however, the quality of the decision making varies according to the person, the particular situational context, and the decision-making process (or model) used. But what can educators do about that variation in effectiveness? If it is imperative that teachers and administrators become high-performing decision makers for their students to achieve their learning potential, what conditions or circumstances mitigate decision-making effectiveness? In essence, what factors negatively influence or impede the quality of the decisions being made in schools and by teachers in classrooms?

### *Factor 1*

Teachers possess limited technical skill in using and interpreting data. Until recently, the demands placed on educators to use data to make decisions were limited, or at least they were not formalized and explicit. Clearly, the No Child Left Behind (NCLB) legislation in 2002, whether right or wrong in terms of its expectations, has placed more emphasis on using data to make decisions about efficacious educational practices.

Regrettably, far too many teachers and administrators have far too little preparation for interpreting the test results (and other data) they now have available (Jerald, 2008). Reeves and Burt (2006) note that practicing educators are often well aware of their deficiencies in data analysis: "Principals expressed concern about their own lack of training and understanding of how to use data. Several admitted having fears about mathematics and data analysis" (p. 67).

As a result, many educators over-rely on the basic decision-making model (i.e., one person using limited data to make a decision) because they do not trust themselves (or perhaps others) to engage in more sophisticated types of analysis. They simply do not believe that their academic preparation provided them with the skills necessary to conduct more sophisticated analysis or that their innate abilities predispose them to examine complex databases in ways that will result in enhanced practice. Further, they may not know how to access or use the type of expertise needed in order to more thoughtfully examine multiple data sources. If teachers and school administrators are going to be expected to analyze complex databases and "cross-tabulate information to work for telling patterns" (Jerald, 2008, p. 68), they need the preparation to engage effectively and confidently in such analysis.

### *Factor 2*

Teachers are provided with too little time to make thoughtful decisions. Today's complex school environments increasingly require teachers and administrators to accommodate a wide variety of student needs with little time and too few resources to discern how to make requisite educational accommodations. Rubenfeld, Newstrom, and Duff (1994) observe: "This need to respond rapidly to competitive pressures is often exacerbated by resource limitations and frequent staffing alignments, which together may have the effect of discouraging careful and thorough analysis" (p. 20).

True, readily available software (such as Excel and Statistical Analysis System or SAS) offers the potential for powerful and efficient data analysis. Equally true, teachers and administrators need training and practice time to really understand how to use this software for their specific data analysis needs. When educators possess volumes of data but lack the requisite professional development opportunities and time for professional reflection to learn how to benefit from them, they are positioned for frustration and failure. Rubenfeld et al. conclude: "technological advances may [even] have a negative effect since they can provide so much data and information that the decision maker may be overwhelmed and find it difficult to determine which are actually most germane" (p. 21).

### *Factor 3*

Teachers are provided with too much disaggregated and untimely data. The NCLB legislation has fostered increased testing mania in P-12 schools, resulting in data overload for teachers and administrators. Complicating matters, teachers and administrators are often unable to discern the critical *need to know information from the* less relevant *nice to know* information. The excessive amounts of raw data coupled with the frustrations of how to piece together those data to better structure the learning environment are frustrating and even crippling for many educators. Reeves and Burt (2006) describe this phenomenon using the words of one data-overloaded principal: "We have so many pieces—I know that each piece has its own job, but it's overwhelming—to get it all and make sense" (p. 69).

The combination of too much data and too little time for analysis may be one reason that educators tend toward the use of basic decision-making models (Ikemoto & Marsh, 2007). Complex data analysis and inquiry-focused decision making takes time, requires resources, and necessitates a level of collaboration that seems out of reach to far too many classroom educators.

## Data-Based Decision Making: Essential Factors

Helping teachers and administrators become effective data-based decision makers requires more than the initial step of addressing the mitigating factors (i.e., providing more time for data analysis, more professional development, and focusing the data collection processes). Even if more time is provided and enhanced data analysis skills are acquired, the full capacity for high-performance data-based decision making requires two additional, essential ingredients: an appreciation of the inquiry process and empowerment to act on acquired knowledge. These two ingredients move educators beyond being minimally involved consumers of data to a level where they champion effective data-based decision making for improved student outcomes and fight for the necessary resources to do so. As Smith (2008) notes:

> One of the more promising approaches to improving instruction involves the use of systematic and frequent data to inform teachers and students about how well students are learning the material and strategies they are expected to be learning. Substantially improving student performance—bringing almost all students to *challenging* standards of achievement, whether at the 2nd grade or community college level—appears to require that teachers have the data, skills, and opportunities necessary for continuously improving their instruction. As many researchers argue, systems of formative assessment, where teachers regularly identify and respond to students' changing needs, can lead to very substantial gains in student performance. (p. 379)

For those student gains to be realized, teacher inquiry is imperative. The inquiry process is important because, quite simply, we still know far too little about the instructional process. The absence of defined, empirically based instructional protocols means that all teachers must be inquirers. Research findings with direct and specific applications to classroom settings remain limited (Jalongo, 2006). Until we know with more certainty what constitutes best practices for the particular students being taught, it is imperative that each teacher be focused on identifying, in context and using the data available, what practices are most efficacious.

There is a certain idiosyncratic and highly contextual nature to the teaching process. Two teachers might take the same data, engage in very complex analyses of that data, but reach different conclusions on how to teach required content. Students adjust to those differences, but what may be altered differentially is the amount of learning. That is, students with reading Teacher X may grow 1.3 years and with Teacher Y .8 years. Growth occurs for the students with both teachers, but the amount of growth is the dependent variable. Teachers who are inquirers look for such outcomes (and for whether there are patterns in the learning outcomes) and then engage in additional inquiry to identify methods to enhance student performance through subsequent instructional interventions.

Earlier in this chapter, Gawande's bell curve of CF doctors was used to illustrate high and low professional (medical) performers. Gawande identifies one weak performing hospital (Cincinnati Children's) but then illustrates how, through the inquiry process, it began to systemically transform the quality of its service delivery. Being a low performer should always be a temporary phenomenon. Once data illustrate a performance level, the conscientious teacher, administrator, or doctor can (and should) begin to search for better answers regarding how to serve clients or students.

Empowerment to act on acquired knowledge is essential, as is a willingness to consider change. The empowerment imperative means that teachers and administrators who are equipped with newly acquired knowledge may have to act in ways that are counter to personal dispositions. The gifted lecturer may be uncomfortable moving toward more student-centered inquiry or the "new math" advocate may feel "compromised" when a search for how best to teach urban, high-poverty third graders leads him or her to the selective use of direct instruction methods.

"Low performers" are individuals bound by what they already know and uncomfortable with new information that might change how they interact with students.

"High performers" on the instructional bell curve, are those consistently engaged in researching best practices and personally willing to act on that newly acquired knowledge in ways that benefit the students they are teaching.

## The Context for Using Data

Using data in meaningful and significant ways means that teachers and administrators have access to good, usable data. That assumption is far from valid for many practicing educators. In many instances, data availability is simply not a reality. In other situations essential data are not available in a timely fashion. I conclude this chapter with a discussion of both of these circumstances.

The No Child Left Behind legislation has generated a national testing mania, and though critics and advocates debate heatedly the efficacy of the law, relatively independent and non-ideological think-tanks have concluded that NCLB has had a positive impact on student performance. Student achievement appears to have increased in math and reading since enactment of the legislation in 2002, and in a majority of states with adequate data (9 of 13 states), gains in test scores have been greater after NCLB than before its implementation (Center on Education Policy, 2007). That is the good news! (See, for example, Table 15.1.) The bad news is that far

**Table 15.1** Comparison of trends on state middle school math tests and NAEP Grade 8 math tests.

| *Change on State Test* | *Gain on NAEP* | *NAEP Flat* | *Decline on NAEP* | *Total* |
|---|---|---|---|---|
| Moderate to large gain | 16 states<br>CA, DE, FL, GA, KS, IA, MA, MS, NE, NJ, OR, PA, SD, TN, VA, WA | 7 states<br>AL, HI, ID, IN, MI, NY, RI | 9 states<br>CO, IA, KY, MD, ME, NH, UT, WV, WY | 32 |
| Slight gain | 3 states<br>IL, NV, SC | 1 state<br>NC | 2 states<br>MO, OK | 6 |
| Slight decline | 1 state<br>WI | | 1 state<br>CT | 2 |
| Moderate to large decline | | | | |
| Insufficient years for trend | 6 states<br>AR, AZ, MT, NM, TX, VT | 2 states<br>ND, OH | 2 states<br>AK, MN | 10 |
| Total | 26 | 10 | 14 | 50 |

*Note:* Thirty-two states have demonstrated moderate to large gains on state middle school (usually Grade 8) math tests since 2002. Of these, 16 states also showed gains on NAEP Grade 8 math tests between 2003 and 2005, while 7 states had flat results on NAEP, and 9 states showed declines.

This figure compares trends in the percentage of students scoring proficient on state middle school (usually Grade 8) math tests since 2002 with trends in the percentage scoring basic on NAEP Grade 8 math tests between 2003 and 2005.

*Source: Has student achievement increased since No Child Left Behind?* (2007) Washington, DC: Center on Education Policy.

too many teachers are still not taking advantage of test data in ways that really benefit student learning.

One reason is the excessive lag time between the point of test administration and the time when results are received, with the consequence that teachers simply are not using data in instructionally effective ways. Kozol (2005) describes this circumstance as he depicts the differential educational experiences provided to Black and White students in America's urban schools. His rhetoric about schooling in urban America is harsh, and at times debatable, but his observation about schools' inability (through most standardized tests) to provide alacritous access to essential data about student learning needs is unquestioned. Kozol writes:

> The usual administrative rationale for giving tests like these [standardized tests] to children in their elementary years is that the test results will help to show their teachers where the children's weaknesses may lie, so that they can redirect the focus of their work in order to address these weaknesses. In practice, however, this is not the way things generally work, because of the long lapse in time between the taking of these tests and the receipt of scores.
>
> Principals and teachers in some schools have told me that the scores on standardized exams, which are administered most frequently between late winter and the early spring, are not received until the final weeks of June and, in some cases, not until the summer. "I get no help from this at all," a teacher in one Massachusetts district told me. "By the time the scores come back, they're not my students anymore, unless they fail—and then maybe I'll see them in my class again the next September." In some states, test results are given to the teachers far more quickly, and in a number of districts, including New York City, "interim assessments" have been introduced so that teachers can derive some benefit from these exams close to the time at which the children take them; but this is not the pattern in most sections of the nation. (pp. 115–116)

Being able to make good use of data means that teachers must have more immediate access to the type of testing data that will help them discern what their students know and do not know. Fortunately, some testing companies (such as the Northwest Evaluation Association or NWEA) are finding ways to deliver tests more effectively, to provide test results more rapidly, and to gauge student academic groups in more instructionally and curriculum-sensitive (aligned local and state expectations) ways (Springer, 2008). Internet-enabled testing systems such as NWEA clearly represent the future, but for many students that future possibility is more remote than real. The consequence being that far too many teachers continue to administer tests without concomitantly using test results (since those results are not available to them in a timely fashion) to determine instructional interventions.

Even those who do have access to student data, however, often find that the data systems are simply not in place to ensure a comprehensive understanding of each student's academic status and potential. For example, many states are still not able to provide growth data on students, which means that teachers are still judged too heavily on the intellectual capital students bring to school as opposed to the intellectual and academic gains fostered by each teacher at a school. Ensuring that students realize fully what schools can provide will necessitate the creation in all states of a seamless P-16 data collection and management system.

The development of enhanced data management systems is the result of more emphasis on using data to make critical instructional decisions. Such decisions at the classroom level became increasingly difficult due to the highly mobile environment found in American schools and given the absence of comprehensive data management systems at the state level. As students migrate across schools and districts, providing appropriate educational growth measures to a student's new school is impossible if appropriate background data on each child are not available. Those statewide data management systems must also be sophisticated enough to accommodate the growing numbers of P-12 students who are home-schooled and/or taking coursework online. In essence, states will have to develop and implement student information systems that "track students over time as well as collect the student demographic data essential for disaggregating test scores by subgroups" (Sunderman, 2008, p. 129).

At minimum, Ewell (2007) identifies the following data elements that must be a part of any data management system: a unique student identifier for each learner (an identifier should not just be the student's social security number); an appropriate demographic description for each student; the competency descriptors (to include how the competency was assessed); and, for postsecondary students, descriptors for the different educational delivery methods (e.g., distance learning) that a student has had during his or her P-16 experiences.

Unless teachers have timely data (i.e., immediate access to appropriate test data) and a means of monitoring and securing such data throughout and across a student's educational history, the ability of teachers to use data in ways that enhance their decision making and foster student learning will be compromised. Clearly, individual teachers and school districts have always maintained student files. What is now required are centralized data management systems in all 50 states that provide teachers with access to information about students and that document what students have achieved in learning experiences in multiple educational contexts.

## Summary

Good teachers have always used data to make decisions. In the past, that meant relying on subjective assessments (soft data) about student performance and careful examination of student performance on a variety of formative and summative tests. Good teachers in the future will do the same thing: they will use both informal personal observations of student performance and formal assessments (teacher-made and standardized tests) to make instructional judgments. The difference will be (should be) how readily they can access more formal data sources to enhance and explore the informal assessments that they make daily.

They will (and should) use both because even with good data, accessed quickly, they may know what students have learned, but not necessarily why such learning occurred, nor how to achieve similar results for all students (Ewell, 2007). In essence, using data to make decisions will continue to be part art, part science. The good news is that the science has the potential to inform the art in ways that have simply never been possible in the past. And, as a consequence, student learning for all should be fostered in ways that have never been achievable because teachers either have not been given adequate data or have not known how to interpret such data when they were available.

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