

IN LIGHT OF THE LIMITATIONS OF DATA-DRIVEN DECISION MAKING

Susanna Loeb

Students' experiences and the opportunities they have to learn rest on the quality of education decisions made in each classroom, in each school, in each district, and in each state, federal legislature, and department of education. Who can run schools? Who can teach? What content is covered? How is it taught? Which students are in each class? When is recess? How much money is spent, on what and on whom? These are just some of the decisions that must be made and whose answers affect students. The role of research and scholarship more broadly in education finance and policy is to inform these decisions for the benefit of students. In practice, however, the influence of research is often opaque. The lack of transparency comes not only from poor decision making but also from good decision makers weighing incomplete information about the likely effects of their options with a logic about how the world works. Useful education research builds these logics and provides information about the effects of specific choices. It also identifies individuals with the greatest potential to make good decisions given this incomplete information and the need to use judgment in decision making.

Data-driven decision making is the mantra of many recent education reform discussions. The Web site of the Institute of Education Sciences, the research arm of the U.S. Department of Education, states, "By identifying what works, what doesn't, and why, we aim to improve educational outcomes for all students, particularly those at risk of failure." The Center for Data Driven Reform in Education (2011) "conducts research into how school districts can use data-driven reform to improve student achievement." One of the Spencer Foundation's (2010) strategic initiatives seeks to understand data use and educational improvement. The rhetoric clearly supports data use in education decision making, but the use of data in actual decisions is rarely direct or transparent.

More information and more accurate information can improve decision making, but consequential education decisions are almost uniformly and inherently gray. That is, even with the best available information about the present and the past, decisions about the future rely on judgments as well as knowledge. In choosing a math curricular package, for example, it is useful to consult the What Works Clearinghouse to help identify programs that have been successful; however, there are unlikely to be any one-size-fits-all solutions. The merits of a particular curriculum likely depend on the local context and change as new programs and goals are developed.

A reasonable decision maker will also consider the needs of her students and how those needs compare with those of the participants in the study. She will consider whether more promising approaches have been developed, even if untested, that might work better given her goals and contexts. She will consider the likely response of students to the different approaches, combining information about the students' needs and the options available to meet those needs with her own logics about factors that might be affected by the choices she makes.

Many choices have even less supportive research available than the choice of curricular programs. For example, in considering which teacher to hire, there is evidence that a master's degree does not guarantee success and that teachers with some experience are more effective than those with none. There is also evidence that a candidate's performance on a variety of assessments measuring general knowledge, knowledge for teaching mathematics, verbal ability, and other skills and dispositions are predictive of later success in the classroom. But even if data on teacher characteristics that are predictive of student learning were available, which they rarely are, an effective hiring authority knows the limitations in applying these average effects to the individuals in front of her and will collect her own informal data from interviews, teaching demonstrations, and letters of recommendation. In making her choice, she will combine sources of information with her own logics of what skills a teacher needs to be successful in his school.

The most wide-ranging questions—designing systems for school finance or governance, choosing certification requirements, or setting up charter school laws—are often the least directly informed by empirical research. No randomized experiments have tested (or in many cases can test) the efficacy of these types of policies, and even correlational, quasi-experimental studies are rare and often infeasible. Instead, decision makers draw on resources such as data that are peripherally related to the decision in question, anecdotal information, and their own logics about important mechanisms to consider. In choosing certification requirements, decision makers may draw on information about whether teachers who have taken more math courses in college are more effective at increasing student learning. While relevant, this information can also be misleading; even if teachers who have taken more math are more effective, mandating additional courses in a certification system may fuel unintended consequences. For example, if poor-quality, low-cost coursework options spring up if teachers seek certification but are not interested in their own improvement. Alternatively, the observed relationship between math classes and effectiveness may be driven by more effective teachers choosing to take more math, and not the causal effect of math classes on effectiveness.

Given the inherently incomplete information available about the effects of each of their choices, decision makers draw on their logic about the likely effects of each choice. Logic might warn decision makers away from choosing a finance system that provides more money to districts that categorize more children as special education students or from a chartering system that assigns districts—potential competitors to new charters—as the sole chartering authority. They may worry about the responses of local actors as the system creates incentives for them to classify more students or to charter fewer and less competitive charters.

Many logics come from individual experiences, such as seeing a student helped or hurt by an instructional approach or an available support service, or seeing a teacher move to a school with a higher-scoring student population or a collegial work environment. But often logics come from shared experiences captured through research or scholarship—poorly designed accountability systems create strong incentives to game, it is easier to attract teachers to some schools over others even when salaries and benefits are the same, and curricular materials that work well with native English speakers may not work well with

English learners. Even if research cannot identify the effects of each choice a decision maker has (and it rarely can), scholarship can inform choices by developing and solidifying these logics. Research both identifies potential mechanisms and provides estimates of the likely strength or salience of each of these mechanisms. As an example, in thinking about special education finance, one might identify the potential response of districts to monetary incentives to classify more students as in need of special education; empirical research can then inform the extent to which districts tend to respond strongly or weakly to these incentives.

In some decisions, lack of knowledge (or facts) is a binding constraint in good decision making, but a narrow focus on increasing this knowledge can obscure the importance of judgment and both the individual experiences and the public scholarship that generate this judgment. Randomized experiments that evaluate curricula and professional development programs or research that uses multiple measures of students' progress and teachers' instructional practice improve our knowledge of what has worked. However, most decisions are based only indirectly on these facts. Instead, they come from the theories and frameworks for how the world works that arise from these facts as well as from each decision maker's experience. The scholarship that contributes to these frameworks, by synthesizing the internally valid experiments as well as the descriptions of the world, are more proximate to most education decisions than the results of individual research projects.

The above discussion highlights three noteworthy resources for educational decision making. First, decision makers need information about their needs: Do students need help with vocabulary or grammar? Fractions or decimals? Does the school have trouble finding teachers with strong content knowledge or strong instructional skills? Second, good decisions rely on solid information about the options. If the decision maker is not aware of the best options, he or she will not choose them. Third, good decisions depend on a broad understanding of how the world works, particularly regarding the decision in question. If additional preservice work is required of teachers, will its benefits likely outweigh the costs of individuals choosing not to teach because of upfront costs? If classes differentiate students by achievement level in science, will the benefits of more appropriate content for a given ability outweigh the potential costs of signaling low achievement of some students?

Knowledge of needs and options and solid logics for incorporating this information to predict policy effects are a base for good decision making, but they are not the only important factors; two more stand out. First, to make good decisions, leaders need the resources, especially the time, to collect and process the information available to them. Second, decision makers need to share the goals of the broader community with the resulting incentive to work toward these goals. Much recent discussion has focused on the need to align the goals of education decision makers (teachers and principals) with the goals of the community. For example, accountability laws such as No Child Left Behind, as well as pay-for-performance reforms, aim to align the goals of teachers and school leaders with those identified in the policy, usually achievement gains for students in math and reading.

While the five features of good decision making are constant (knowledge of context, knowledge of options, an understanding of the world, time and other resources for processing information, and aligned goals), the individual most suited to make a given decision will vary given the question and context in which they operate. The choice of who makes decisions is one of the most influential education choices. Improvement in the education system may depend partially on increasing the available information and refining frameworks for processing that information, but it also depends on wisely choosing the person making the decisions. There are an endless number of decisions that must be made within education. We can change the system by changing who makes which types of decisions as well the supports they have for making those decisions.

Education decisions may be made by the central government (the state or federal government in the United States), local government (districts), schools, teachers, families, or a range of other actors. Consider the question of who teaches. Schools could simply choose their teachers from the full pool of individuals they can attract. The district could do the same, or the central government could do the same. Alternatively, the central government could set standards and schools could choose from teachers meeting those standards, or districts could further restrict the pool available to schools. Teacher preparation programs or teacher organizations also may limit the pool through admission decisions and collectively bargained contracts.

The optimal distribution of decision-making authority depends on who has access to the five features of good decision making. Schools and families are likely to have the best information about their local needs, though perhaps less information about the long-run needs of students as they enter the workforce. Some principals, superintendents, and content specialists in state departments of education may have the best knowledge of options available for the questions at hand, though knowledge variation across school and district leaders is likely to be large, resulting in unequal quality of decisions. Similarly, productive frameworks for processing data to inform decisions may be more common in one or another level of the education system. In a well-functioning democracy or republic, the goals of elected officials may be more aligned with societal interests than the goals of those further from the threat of losing elections, but this is clearly not always the case, both because policies can influence goals at all levels and because elected officials have alternative goals as well.

The advantages and disadvantages of different levels of decision making are not stagnant. Advances in communication and in knowledge of what works could improve local access to information on options and higher-level access to information on needs. Accountability systems can realign the goals of local actors so they are more in keeping with the goals of the broader community. While these changes are feasible and often useful, some changes are easier than others. It is difficult to imagine enough capacity at the federal level to choose which teachers teach which classes, or even which teachers are best for each school. It is also unlikely that each school would choose its capital construction to meet safety desires of the community without higher-level standards. Some decisions are better made locally and some are not. While part of the goal of education research is to inform decision makers, an equally important goal is to identify which potential decision makers are best

suiting for each type of education decision. Should parents choose the schools their children attend, or should local or higher-level government actors choose? Should superintendents, principals, or teachers choose curricular or instructional approaches?

If we take as a given that the goal of research in education finance and policy is to inform education decisions for the benefits of students, either in the short or long term, the merits of research should be judged by its ability to do so. Multiple types of empirical research do and should inform decisions.

The recent push for more facts and more valid identification of the effects of different approaches was the response to a lack of basic information to build logics that support effective decision making. In many areas, knowledge about educational needs and options can be gained at relatively low cost and could meaningfully improve decisions. A variety of research approaches can provide this knowledge if they are done well. A poorly identified study of the causal effect of a program may tell us little that helps in making the next decision. On the other hand, a perfectly identified causal study of a program can contribute to a decision, but it is unlikely to provide full information for an obvious decision. Similarly, descriptions of the world can inform decisions just as effectively as causal studies if they identify needs or lead to hypotheses that change the set of considerations involved in a decision. Yet, like causal studies, descriptive studies also can be unhelpful if they do not provide the insights needed to better understand needs and options. Both descriptive and causal analyses can be facilitated. If program rollouts were designed with evaluation in mind, learning about effects could be part of the implementation, and the knowledge base could be built without the additional costs of large-scale studies. As more and more varied information on students becomes available for the population of students, identifying needs and progress will be easier.

Research and scholarship can support decision making not only by collecting data but by hypothesizing and synthesizing knowledge. For the vast majority of sizable decisions, the answer of what is best for the goals we have is not totally clear. Should we create more choice in the school system? Should we have a merit aid portion of our financial aid system? Should preschools function within schools or should we maintain the eclectic nature of early childhood education? Should we structure the curriculum more or less, increase emphasis on science or music, spend more time on physical education? These are big questions, and even if we share goals they are not easy to answer. While formal research results provide information, it is really how this formal information combines with other information to help decision makers think about how the world works that affects how they will ultimately make decisions. Therefore, changing the factors that decision makers consider can affect decisions at least as powerfully as additional information about programs or students. Important scholarship asks us to consider factors not considered before, such as the unintended responses of teachers to accountability or the unintended responses of communities to changes in school finance laws. Once highlighted, these mechanisms become part of the consideration in future decisions.

Finally, education decisions can be improved through research that increases our understanding of decision makers themselves and their access to resources they need for

good decision making—knowledge of needs, options, logics, resources, and goals. Improvement in the education system may come more quickly and more easily by changing who makes decisions than by changing the goals and skills of those currently deciding.

The use of data in decision making is rarely transparent. Ignoring what seem to be facts in the choices education leaders make may in fact be the result of conceptions— developed with the support of data and research—about how the world works. The role of researchers, then, is broader than providing pieces of information. It is to support effective decision making by providing information on needs and options as well as frameworks for understanding the world. It is also to identify education systems that give decision-making authority to individuals most likely to have access to the resources needed to make good decisions.

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