

## EFFECTIVE USE OF DATA

### **Research Review-The Effective Use of Data**

Our goal for this series of research reviews is to provide education leaders and teachers with evidence-based strategies to ensure that great teaching and learning is consistently realized in all Florida schools. We believe that if education leaders are empowered to know how to recognize, support, and scale excellent teaching practices, we will see tangible results in the classroom.

In partnership with the University of Florida's Education Policy Research Center (EPRC) and the Lastinger Center for Learning, Impact Florida launched a project to describe the evidence base for the Five Conditions that Support Great Teaching. While we recognize that there are many conditions that factor into a student's ultimate success, Impact Florida focuses on those system-level factors that most significantly impact classroom teaching, student engagement, and learning.

This research review summarizes research on educators' effective use of data. This paper summarizes best practices around data-informed decision making, describes how successful data use differs for various school district stakeholders, and suggests how data use can be used to foster more equitable student opportunities. To accomplish this aim, we synthesize recent research examining data use throughout school systems.

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## The Effective Use of Data

A coherent framework for making well-informed, data-based decisions is critical for educators. Although the research literature is replete with success stories of how data has been used to improve teacher instruction, school practices, and school district strategic planning, researchers have emphasized barriers to the successful use of data (Coburn & Talbert, 2006). The difficulty of effective data use is born out in research on the topic. In a recent review of 39 data use studies, only 15 showed a consistently positive relationship between data use and student achievement (Grabarek & Kallemeiyen, 2020). Ten of the studies showed a mix of positive and negative results, and 14 showed no relationship. These findings should not be taken to suggest that data should not be used within schools, but rather, they underscore the need for educators to better understand how to use data effectively.

Scholars contend that successful data use involves shifting from a mentality where data is treated as a tool for identifying simple solutions to one that informs educators' learning about how to better meet the needs of students in their classroom, school or district. Unfortunately, schools and districts have not consistently made space for educators to use various types of data as the basis for making sustained and systematic improvements (Coburn & Talbert, 2006; Marsh, 2012). In addition, data has come to be associated with a narrowed understanding of student success, often at the expense of more expansive notions of student flourishing and well-being.

In summary, *the effective use of data requires developing the systems, structures, and culture around data use that elevates data as a driver of continuous improvement. Achieving this goal requires a systemwide commitment to supporting educators' and administrators' successful*

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*use of data through the use of multiple forms of data, disaggregating data to identify opportunity gaps, and integrating data into decisions throughout a district.* This definition of effective data use guides this review. It is important to emphasize that when we talk about data, we define the term more broadly than it is often understood in school districts. Specifically, data refers to systematically collected information on student and school outcomes, perceptions, school processes, and demographic characteristics. This definition not only includes quantitative data, such as standardized achievement test data, but also qualitative data, such as artifacts from classroom observation or student focus groups.

This paper summarizes best practices around data-informed decision making, describes how successful data use differs for various school district stakeholders, and suggests how data use can be used to foster more equitable student opportunities. To accomplish this aim, we synthesize recent research examining data use throughout school systems.

## **Best Practices in the Effective Use of Data**

Reducing obstacles to data use, whether through increasing access to timely and relevant data or training to support its use, is a critical first step in improving data use within schools and school districts. That said, a prevailing theme from research on educator data use is that the provision of data alone is not sufficient for data to be used to inform decision-making (Drake, 2021; Grissom et al., 2017; Marsh, 2012; Marsh et al., 2006; Wayman, 2005). For instance, a recent study of educator use of NWEA MAP interim assessment data showed that educators only logged on to the system a few times a year and, when they did, only accessed a few of the available reports (Farley-Ripple et al., 2021). The effective use of data also depends on the development of norms and routines shaping its use (Coburn & Turner, 2011).

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### **Reduce the Obstacles to Successful Data Use**

Researchers have identified two main obstacles to successful data use within schools: lack of timely access to relevant data and lack of support in how to successfully use data to inform decision-making and time to undertake this work (Marsh, 2012).

### **Improve Access to Relevant and Timely Data**

School districts continue to make significant investments in the technology to aid in data collection, storage, and analysis (Drake, 2021). These investments are increasingly oriented around the goal of improving access to relevant and timely data for end users (i.e., principals; teachers). Data dashboards enable the easy disaggregation of student data by background characteristics, grade level, subject area, and academic standards, among others (Bowers, 2021). The focus on these systems has been to improve usability. Teachers and principals report that data dashboards have made certain types of data readily available (e.g., student demographic characteristics, attendance, and achievement; Bloom-Weltman & King, 2019). Yet, these data sources that are most relevant to district administrators' decision-making are not always as relevant for teachers (Coburn & Turner, 2011). Teachers report that the types of data typically available in these dashboards are (1) not used as extensively as other data sources and (2) are the least beneficial for their instructional practice (Farley-Ripple et al., 2021; Farrell & Marsh, 2016; Jimerson & Wayman, 2015). Instead, state assessment data might inform student assignment and grouping decisions at the beginning of the school year but little else as the school year progresses (Farrell & Marsh, 2016).

When making instructional decisions, teachers report that the data that is most closely tied to their classroom practices to be most beneficial (Farley-Ripple et al., 2021; Reeves et al.,

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2021; Wilkerson et al., 2021). Teachers report that student work, teacher-developed assessments (e.g., unit quizzes and tests), and, to a lesser degree, common assessments (i.e., educator-developed assessments given by all teachers in a grade or course), to be most useful in shaping changes in instructional delivery (Farrell & Marsh, 2016). That said, teachers generally report that they do not make ambitious instructional changes as a result of data analysis, instead using data to guide decisions about re-teaching and student grouping. In addition, teacher-developed assessments often vary in their level of rigor at different schools and classrooms across a district. Thus, we generally recommend the use of common district-wide assessments, whether locally developed or proprietary.

One approach that has promise, but requires significant investment of resources, is the development of common district wide assessments by a representative group of teachers and curriculum experts. Common assessments can assess particular standards, but also be relevant to local contexts, such as being aligned with district pacing guides. As they assess the extent to which students have mastered the curriculum that was taught, they can often provide more meaningful data for teachers. In districts that develop common assessments, administrators will likely need to provide professional learning around (1) strategies to design high-quality assessments, including how to monitor for validity and bias, and (2) a description of the inferences that can and cannot be drawn from different types of assessments (i.e., assessment literacy; Farrell & Marsh, 2016). To ensure that these assessments are fair for diverse groups of students, district stakeholders require expertise in the use of standards for the design of educational testing (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 2014).

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Even if locally developed assessments are generally perceived as being most useful to teachers, benchmark or diagnostic assessments—such as those conducted through iReady and Istation, among other providers—fulfill several reported needs of teachers, including timeliness, disaggregation, scope, and alignment (Farrell & Marsh, 2016). They are timely, with student performance being quickly reported to teachers. They allow for disaggregation across multiple dimensions, including by the teacher, classroom, individual student, and academic standard (Farrell & Marsh, 2016). This disaggregation allows teachers the opportunity to focus on particular students in need of additional support. Comparing across classrooms, either in the same school or district, can help teachers to identify standards that need to be re-taught. At best, they are aligned to the state standards and end-of-year or end-of-course assessments, which contributed to their perceived usefulness in re-teaching. Despite these benefits, no research was identified indicating that teacher use of benchmark data is associated with instructional adjustments other than re-teaching what has already been covered (Farrell & Marsh, 2016). Questions also remain about the perceived credibility of benchmark data compared to locally developed assessments (Farrell & Marsh, 2016), again underscoring the need not only for access to relevant data but training in how to use different assessments of student learning. For instance, progress monitoring may assess content that a teacher has yet to teach, limiting the usefulness of these assessments. As Florida shifts towards state-developed and state-mandated progress monitoring assessments, it should be accompanied with ongoing supports to help teachers use this data to inform instructional improvements in their classrooms.

It is also important to emphasize that the design of assessments themselves can limit teachers' ability to diagnose the source of students' mistakes. For instance, multiple choice assessments typically identify student knowledge and comprehension, as opposed to higher level

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cognitive domains (i.e., application, analysis, synthesis, evaluation). As a result, it can be challenging for teachers to ascertain the extent to which mistakes are due to gaps in student knowledge versus their conceptual understanding, external influences, or other academic weaknesses (Datnow & Hubbard, 2015). Teachers may need to incorporate additional measures, such as performance tasks that require students to not only demonstrate content knowledge but their thinking as well. Another approach is to identify students in need of additional instructional support using a diagnostic assessment, but use open-ended assessment to understand the nature of student misunderstanding to guide re-teaching efforts (Garner & Horn, 2018). For a commonly missed problem, teachers may reteach an incorrect problem, having students identify the mistakes. These and other authentic assessments may help teachers develop a more accurate understanding of the source of students' mistakes and improve evidence-based instructional adjustments.

To date, research on educator data use has largely focused on the provision of relevant and timely student assessment data. Multi-Tiered Systems of Support (MTSS), Response to Intervention (RtI), and Positive Behavioral Interventions and Support (PBIS) present opportunities for educators to incorporate additional data sources when monitoring student progress. These emergent frameworks for supporting student development share an emphasis on integrated data systems as the basis for making informed instructional and intervention planning decisions. In many cases, they have also led to the use of new data sources aimed at more holistic approaches to monitoring student progress focused on academic, behavioral, and socio-emotional development. While these approaches have the potential to increase educators' access to a greater diversity of timely and relevant student data, the success of these efforts have not been systematically researched.



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### **Establishing Time for Data Use**

In schools that have pre-existing cultures of teacher collaboration, the provision of dedicated time for teacher data use is described as the most important way to support data use. Whether for teachers or administrators, creating time for data use has consistently been shown to be most important for successful data use. Data inquiry is a time-intensive, collaborative, and cognitively demanding process. Coburn and Turner (2011) write, “In the absence of time to debate conflicting interpretations of data and search for and evaluate different solutions, decision making gets increasingly drawn out, unresolved, and conservative” (p. 182). Common data use protocols aim to transform data analysis from a quick, superficial activity to one of in-depth inquiry (Jennings & Jennings, 2020). While there are numerous data inquiry protocols, they typically walk teachers through a gradual process of interpreting data, constructing meaning, and action planning (e.g., Boudett et al., 2013). That is, protocols are designed to shift data use from a technical process to a highly interpretive one, whereby data can be analyzed and understood as the basis of making concrete action steps to improve teachers’ instructional practice or broader school practices. Recognizing that the lack of adequate time is a constraint to successful data use, the overarching goal of protocol is to simplify data analysis.

Despite the critical importance of time, educators often find they have too little time for data use. In such circumstances, school administrators, often in collaboration with data clerks, can do more to identify the data that is most relevant for teachers. With so much data now available in schools, using consistent data across classrooms can be important to streamline data use. These data will often begin with the outcomes measured in state accountability systems, but others may be relevant in some schools. Additionally, ahead of any teacher data analysis, data can be pulled to help to answer teachers’ pre-identified questions. For instance, data clerks could pull data on the students that have shown the most or least growth in a subject area in the current

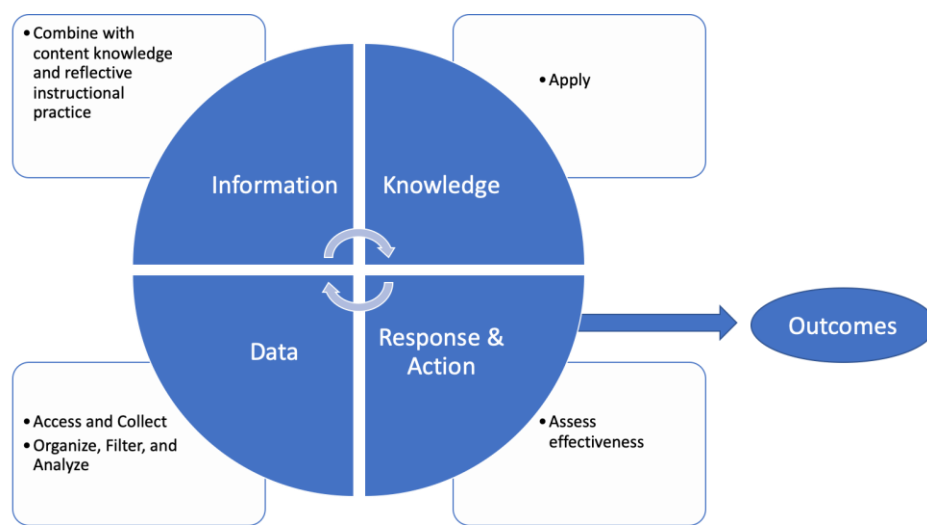
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grading period, so as to support teacher discussions about the strategies that have worked best or those that need to be further developed. These strategies can help to make time for data use most efficient, even when adequate time is not provided for teacher data use.

### Provide Support for Teacher Data Use

Despite what the term *data-based decision-making* might imply, linking data with decision making is by no means an automatic process. Figure 1 provides a path model describing how data-based decision-making occurs. Data must be “analyzed to become *information*, and then combined with stakeholder understanding and expertise to become *actionable knowledge*” (Marsh, 2012, p. 3). In other words, data use is an interpretative process that not only requires a high degree of data literacy, but an understanding of how data relates to the users’ pre-existing knowledge. In cases when data is used to make instructional decisions, it is often in concert with other information (Mandinach & Schildkamp, 2021). This approach to data use views assessment data alongside other forms of systematically collected information that inform teachers’ understanding of students’ strengths and areas for growth (Grabarek & Kallemeyn, 2020).

**Figure 1. Data use Theory of Action**



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*Notes.* Adapted from Marsh (2012).

In this section, we first explain the ways in which various district stakeholders can support teachers' data use. We then touch on the ways in which the training and supports for school administrators overlaps and differs from those that teachers benefit from.

### **Professional Learning to Support Teacher Data Use**

Professional learning can help to develop some of the technical skills supporting educators' use of data. Supporting teachers' effective data use also requires sustained opportunities for teachers to engage in data inquiry, often with the support of school administrators or instructional coaches. Bowers (2021) summarizes: "[T]his work is not a one-time or rare event, but rather effective data use practices include regular ongoing discussions by the teaching faculty, facilitated by school leaders, but ultimately owned and conducted, as the work of teachers, for the work of teachers, to inform their daily instructional challenges focusing on the content they are teaching and the results of assessments and inferences for their students" (p. 9).

The need for in-depth professional development to promote data use appears to be a necessary condition to promote consistent data use (e.g., Gallimore et al., 2009), but the specific design can vary depending on how data is and is not being used across different school and district settings. For instance, researchers have emphasized that teacher data literacy requires a complex and intersecting set of knowledge and skills related to teachers' reflective instructional practice, content knowledge, and pedagogical content knowledge (Filderman et al., 2021; Gummer & Mandinach, 2015). Successful teacher data use involves identifying problems, framing questions, making instructional adjustments, and monitoring the outcomes. Some teachers may require training and support in how to transform data into usable information (i.e., assessing data quality or the properties of different data sources; analyzing student data to

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generate hypotheses) whereas others may benefit from the supports that help them transform this information into instructional decisions (i.e., designing and implementing instructional adjustments; monitoring outcomes of these adjustments; Gummer & Mandinach, 2015).

Recent research suggests that a collaborative training format with active learning opportunities to be the most strongly associated with data literacy (Filderman et al., 2021). Training also appears to be better received when it emphasizes the theory of action as to how the data are to be used, including how teachers are envisioned using data to inform their instructional practice (Gearhart & Osmundson, 2009; Kerr et al., 2006; Supovitz & Weathers, 2004). Unfortunately, in many school districts, the theory of action is not sufficiently detailed as to how data is envisioned as improving instruction. For instance, data is often seen as a tool to guide re-teaching or identifying students in need of additional help as opposed to changing how teachers orchestrate students' learning experiences or how school leaders organize school structures.

### **Teacher Professional Learning and Successful Teacher Data Use**

Among the different supports to promote data use, collaboration with colleagues and instructional coaches have consistently been described as the most important steps for successful data use (Grabarek & Kallemeyn, 2020; Marsh, 2012; Marsh et al., 2015). Peer input or the feedback from instructional coaches can facilitate greater depth of data analysis, and avoid interpretive errors. This analysis can form the basis of pinpointing the instructional adjustments that would be most conducive to greater student learning, thereby informing actionable steps they can take in their individual classroom or team (Means et al., 2011). These adjustments include how teachers plan and design their lessons, content sequencing, the curricular materials they use, and instructional adjustments that affect the whole class, small groups, or individual students (Heppen et al., 2012; Kerr et al., 2006; Marsh et al., 2015).

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The success of collaborative data use hinges on trusting relationships between teachers and a commitment to using data for improvement. Coburn and Talbert (2011) elaborate: “Schools with norms that enable teachers to share data about their classroom practice openly, critique one another, or ask challenging questions are more likely to have conversations that delve more deeply into issues of instruction and student learning” (p. 183). Teachers are most likely to use data to inform instructional adjustments when data inquiry is conducted in a “safe space” (Marsh, 2012, p. 13), whereby teachers do not feel the risk of sanction for students’ performance (Lasater et al., 2020; Levin & Datnow, 2012). Lastly, when data is used by teachers in collaborative settings, it also appears that data use is more likely to be sustained over time (Means et al., 2011; Van Gasse et al., 2017).

### **School and District Administrator Support for Teacher Data Use**

There are instances in which teachers are unable to successfully use data to inform their instructional practice (Datnow et al., 2013). In such cases, school administrators may need to play a more active role in shaping teachers’ data use routines. Some specific strategies include “[f]raming about what counts as data, shifting away from data use for simple solutions, and shifting toward student-centered learning” (Park, 2018, p. 643). Principals can also point out ways in which teachers’ instructional adjustments can contribute to the broader goals of the school. When principals take a more interventionist role in teachers’ data use, it is paramount they approach their role in a non-judgmental way, emphasizing the ways in which data inquiry is a process by which all school stakeholders can learn how to better meet the needs of their students. Respecting teachers’ judgment, particularly when it lies outside the content expertise of administrators, can also help to foster teacher trust around data use (Levin & Datnow, 2012).

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There are also instances in which data use routines focus less on ambitious instructional adjustments and instead on using data as a means to differentiate course content or group students (Cosner, 2011; Nabors Oláh et al., 2010; Wachen et al., 2018). Overcoming these challenges requires the support of school and district leaders. For instance, if teachers are expected to use data as a means of identifying content for re-teaching, pacing guides must be flexible enough to allow for such re-teaching to occur (Datnow & Hubbard, 2015). If school leaders envision teachers moving beyond surface-level changes in instruction to more ambitious adjustments, they may need to develop new data use routines that help teachers articulate how data changed their instructional delivery. One such example comes from a study of networked professional learning communities in multilingual schools in Washington state (Thompson et al., 2019). Through a review of student work and classroom observations, middle school science teachers noticed that students did not discuss how they were using evidence when debriefing during group work. In response, they adopted a structured protocol to guide deeper levels of scientific explanation. They then used exit tickets to elicit student perspectives on how the practice was working from their perspective. Data was then reviewed by the science team.

As data analysis work tends to be deeply collaborative, it must be supported by norms of trust and a shared commitment to continuous improvement. To better understand the source of students' challenges and unique learning needs, school leaders can help teachers in being more systematic when supplementing assessment data with other data sources. The creation of student data profiles with multiple forms of data can build a richer understanding of students' knowledge, skills, and areas of growth.

### **School and District Administrator Support for Teacher Development**

There are examples of principals providing meaningful data leadership for teachers, either individually or in professional learning communities (e.g., Halverson et al., 2007;

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Rogeman et al., 2018). Principals can model how student performance data is to be used, particularly when they have the content knowledge that could link data inquiry to actionable knowledge for teachers. In instances in which principals lack the needed content knowledge, principals can work to recruit instructional coaches or other teacher leaders to support teachers' data inquiry (Marsh et al., 2015).

Emerging research also suggests that principals' increased access to teacher performance data opens up new possibilities for data-driven instructional leadership (Cohen-Vogel & Harrison, 2013; Neumerski et al., 2018). Multiple-measure teacher evaluation systems have reinvigorated the instructionally focused role of principals (Neumerski et al., 2018). Observation rubrics are described by principals as providing a common language from which to discuss high-quality instruction and offer formative feedback. In other words, these rubrics allow for finer grain data on teachers' instructional practice.

This richer data on teacher instruction and effectiveness affords new opportunities for school and district leaders in promoting teacher professional development that is tailored to individual teachers' instructional needs (Cohen-Vogel, 2011; Desimone, 2009; Donaldson, 2013; Grissom et al., 2017). One aspect of effective teacher professional development is that it is individualized to specific areas of growth. Having richer, multiple-measure data on teachers' instructional practice provides principals with evidence on how professional development could be customized to address teachers' specific strengths and weaknesses (Neumerski et al., 2018). Finer grain data on teachers' strengths and weaknesses can aid in the identification of relevant professional learning opportunities. Despite evidence that school leaders have an interest in using their school data to identify needed training (Grissom et al., 2017), it is unclear how extensively they actually customize their teacher professional development in this manner. This might be an

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area in which district leaders can provide additional training and support for principals in how best to offer more customized professional development for individual teachers. Administrators may also use teacher performance to guide the provision of instructional coaches (Marsh et al., 2009; 2015; Rangel et al., 2017).

### **Provide Support for Principal Data Use**

Less research has focused on the supports school principals require for effective data use compared to teachers. Yet, unlike teachers, principals in most states are required to have pre-service training on data-driven decision-making. As a result, principals tend to have greater data and assessment literacy than teachers, though there still appear to be challenges in interpreting and acting on student performance data (Filderman et al., 2021; Gummer & Mandinach, 2015).

While there is not as much guidance in the research literature on the ways principals can be supported to be effective users of data, there are some similarities with the conditions under which teachers feel most supported. Administrators report that they want to have training tailored to their individual needs, while also being able to collaborate with other principals (Grissom et al., 2017). For instance, principals prefer using their own school's data in any training on data use (Van Hoof et al., 2012).

When school leaders are trained in how to make more effective use of their school's data, it should be clear whether the training should be interpretation-oriented (i.e., assists with the accurate interpretation of data) versus use-oriented (i.e., identifying the steps in applying data for actionable solutions; Van Hoof et al., 2012). For the former, administrators would benefit from training from those with a more extensive research background compared to the latter, when administrators would benefit from having district staff members who can help principals prioritize target areas and identify appropriate instructional interventions. Principal supervisors



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may even provide on-the-job training for developing principals' abilities in acting on their data (Roegman et al., 2018). For instance, during routine check-ins with principals, they could inquire about how the principal is working with teachers to make data-driven instructional improvements. Principal supervisors might also conduct informal classroom walkthroughs with principals as a means to develop a shared language to discuss instructional matters.

Though formal training and support from principal supervisors is likely important in preparing principals to be effective data users, it is worth emphasizing that they too likely benefit from opportunities for collective data interpretation with other school personnel. As we discuss below in greater detail, when data analysis is done collectively, it can be an important precursor to promoting collective responsibility for student outcomes.

### **Foster the Norms to Establish a Meaningful Data Use Culture**

In addition to the aforementioned obstacles to successful data use, educators' dispositions towards data are a precursor to data use (Schildkamp & Lai, 2013). Consequently, district and school leaders must work to establish and sustain a positive data use culture that shapes how data is perceived and used (Firestone & Gonzalez, 2007). The research literature suggests several ways in which district and school leaders can establish a culture of data use, including: "a clear vision and explicit expectations for data use; resources and systems that allow teachers to access and make sense of data; collaboration around data; a sense of trust and safety related to data use; shared responsibility for school improvement; high expectations for student learning; a focus on continuous improvement; and school leadership that models and supports data use" (Lasater et al., 2020, p. 537). Building off of the previous section describing how data access and training can support data use, in this section, we describe the ways in which school and district leaders shape expectations around data use and how these expectations shape continuous improvement

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efforts. We then elaborate on the ways in which these expectations can help school leaders move beyond a compliance-oriented view of data to one in which they foster shared responsibility for school improvement efforts. We conclude by touching on the school routines that can support data use.

### **Create Shared Data Use Expectations**

School districts now have regular access to increasingly expansive sources of data related to student and educator demographic information, school processes (program implementation; instructional quality), outcomes (e.g., student achievement; attendance; disciplinary incidents), and perceptions (e.g., climate surveys) (Marsh, 2012). These student- and school-level data sources are now often supplemented with principal and teacher performance data (Goldring et al., 2015). This data-rich culture creates unique opportunities in terms of setting expectations of what data should be used for what purposes. By modeling the use of data to make decisions, school and district leaders create norms of how data should be used, and what data is considered valid for making different decisions (Cohen-Vogel et al., 2019; Farrell & Marsh, 2016; Honig & Venkateswaran, 2012; Park & Datnow, 2009). Such efforts are important as norms for how data should be used often differ across district stakeholders, which can be a source of conflict (Coburn & Talbert, 2006).

Given that data-use routines have emerged in the context of high-stakes accountability, educational leaders often struggle to disentangle when data is used to hold students, teachers, and administrators accountable and what data is used for improvement purposes (Marsh et al., 2016). Making this distinction is often difficult in practice. Marsh and colleagues (2008) tell the story of district leaders that, with the best of intentions towards improving student performance, ranked school performance on the district's interim assessments and required the lower ranked schools

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to follow curriculum pacing guides and undergo more intensive monitoring. Elsewhere, Roegman and coauthors (2018) note how the term “data” has increasingly become synonymous with annual state assessments, district benchmark assessments, or common grade assessments.

Transparency about what different types of data are collected and how these data are used to inform various decisions is an important first step for school and district leaders. The long-standing tension between accountability and improvement points to the need for district and school leaders to take steps to distinguish the data that are used and how these data are used for continuous improvement purposes versus when data is used for accountability purposes. In schools and districts that use data primarily for compliance purposes, the focus is on meeting accountability standards and raising test scores, particularly in those subject areas that contribute to school grades (Lasater et al., 2020). While test scores are undoubtedly an important measure of student learning, they do not offer a complete picture of students’ development. The overreliance on test scores as the sole measure of student progress in school is to accept a somewhat limited view of student success. One way district leaders can set data use expectations is to hold principals accountable for using agreed upon data (Grissom et al., 2017; Honig & Coburn, 2008). Another important way in which school and district leaders can set expectations around data use is to explain how student test scores are used alongside other forms of data. That is, while not discounting accountability concerns related to upholding high standards for student and educator performance in the district, central leaders must clearly articulate the types of data that are used in non-punitive ways. Otherwise, researchers have cautioned that well-intentioned efforts to support the use of data to improve instruction can result in a narrowing of school curricula and punitive, compliance-based data use, which can be demotivating for teachers (Booher-Jennings, 2005; Lasater et al., 2020; Marsh et al., 2016).

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Moving beyond a compliance-oriented data use mentality hinges on an explicit focus on how school stakeholders can better meet student learning needs. Bertrand and Marsh (2021) write that “data use does sometimes promote better and more equitable outcomes, especially when educators start from the premise that all students can succeed and that the purpose of analyzing data is to find ways to help them do so.” Thus, a district or school’s data use culture must be centered on a shared commitment to high expectations for student learning.

When shared expectations around data use and actual data use routines are in alignment, it has the potential to foster a sense of trust related to data. Discussing data on student performance can be a vulnerable experience for teachers. In schools with higher levels of trust, teachers are more willing to discuss areas in which they or their students require additional support without fear of recrimination (Lasater et al., 2020). Discussing concerns openly forms a foundational basis for developing plans to better support students’ learning needs. The absence of trust can derail these efforts. In schools with more negative data cultures, teachers may be reluctant to openly share data on student progress if they feel it is used as the basis for making comparisons between teachers. In such settings, teachers feel like they must compete with one another rather than mutually support their colleagues. Lasater and colleagues (2020) quote a teacher in a school with a negative data culture: “You were pitted against your co-teacher. Did I outscore my co-teacher? Then you were pitted against the district. Did I outscore the other district 3rd grades? Then you were pitted against the state . . . I just feel like it was evaluative” (p. 545).

In summary, explicit and shared expectations regarding how different types of data are used for improvement and accountability purposes is a needed step in establishing data use routines that support the successful use of data. When data is used consistently as a tool for

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improvement, evidence suggests it can foster a culture of trust, a key facilitator of successful data use.

### **Continuous Improvement Approaches to Data Use**

One emergent approach to creating common data use processes within school districts is the Continuous Improvement (CI) model. The CI model was first introduced by researchers at the Carnegie Foundation (Bryk et al., 2015), before spreading widely across the country, taking on new iterations in the process (Duff et al., 2019; Yurkofsky et al., 2020). Continuous improvement approaches have been supported by The Bill and Melinda Gates' Foundation's Networks for School Improvement and the National Center on Scaling Up Effective Schools, as well as more site-based efforts to apply CI methods (Yurkofsky et al., 2020). The basis for the CI model is that scaling effective school practices requires understanding the conditions and contexts that enable program success (Cohen-Vogel et al., 2015). This sensitivity to local context elevates the role of data in understanding problems within school systems, assessing whether or not an intervention is having a positive effect, and considering the local conditions that shape implementation (Lewis, 2015).

The first step in a continuous improvement model is to gain a better understanding of how various parts of a school system lead to student (or other) outcomes. Various tools have been developed to create this system understanding, although fishbone diagrams are the most well-known tool. Fishbone diagrams are used to identify causal factors leading to outcomes, so as to identify and classify what could be changed to lead to more desired outcomes.

Continuous improvement, as the name implies, involves a cyclical improvement process where change ideas are identified, systematically tested, and refined over time. Driver diagrams are used to manage this complex change process that can involve multiple interventions taking place simultaneously. Driver diagrams provide a visual aid of the proximal and distal outcomes

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that are expected to change as a result of organizational change efforts. The extent to which these “drivers” of change actually occur provide evidence of the extent to which change efforts are having the desired effect. Recognizing that improving school systems is a slow, deliberate process, Plan, Do, Study, Act [PDSA] cycles are used to test and refine change efforts. Langley and colleagues (2009) and the Carnegie Foundation have developed a suite of tools for enacting a continuous improvement process. Overall, these tools share a common emphasis on using data to iteratively transform local school and district practices to best meet student needs.

While the CI model seems like a promising approach to creating shared data use routines within districts, emerging research on data use within CI models offers some helpful lessons for the continued use of this model (Hannan et al., 2015; Rowland et al., 2018). First, engaging in continuous improvement is time-intensive work, which, consistent with the broader guidance on educator work, requires dedicated time. Unfortunately, in many contexts, educators report time constraints regarding data collection and analysis (Hannan et al., 2015; Rowland et al., 2018). Second, while most educators would affirm their commitment to continuous improvement, the CI model entails a specific set of practices that must be learned. Developing the expertise to engage in CI has been challenging in some contexts (Tichnor-Wagner et al., 2017). Finally, the goal to use data for improvement can become muddled in districts with deep-seated cultures of high-stakes accountability.

Notwithstanding these challenges, educators generally report a favorable attitude towards the CI model in that it supports local decision-making, facilitates inter-school collaboration, and aims to establish a clear instructional vision within schools and districts (Redding et al., 2017; Rowland et al., 2018; Thompson et al., 2019; Tichnor-Wagner et al., 2017). There are important unanswered questions of the extent to which external organizations can support key pieces of the

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CI process, including data collection and analysis. In addition, while additional evidence suggests that the CI model can improve student outcomes, the outcomes appear to be quite variable (e.g., Cannata et al., 2019), which may result from the model's emphasis on customizing practices to local context.

### **School Improvement Planning and Data Use**

School improvement planning marks another way in which administrators can promote shared data use expectations. The goal of school improvement plans is to (a) establish a shared vision, (b) set strategic goals that help achieve this vision, (c) identify areas of staff development, and (d) create measurable outcomes that can be routinely monitored by school, district, and state personnel (Redding & Searby, 2020). These latter two functions of school improvement plans rely on a careful analysis of school data. Unfortunately, research suggests that analyses of school performance are typically not done with much depth (Meyers & VanGronigen, 2019; 2020). In addition, the content of most SIPs is closely aligned with the prescribed outcomes of state accountability systems (Mintrop et al., 2001; Mintrop & MacLellan, 2002). As an example, school improvement plans in Florida are auto-populated with the achievement data that comprises school report cards. While school leaders can integrate additional data sources, it is unclear the extent to which this happens in practice. Districts leaders can help overcome this latter challenge by identifying other data that could be included in SIPs so as to promote a shared vision around district instructional priorities (Mean et al., 2010).

School administrators can take a couple steps to use SIPs to create a vision of the school as a community of learners (Blase & Blase, 2006; Grissom et al., 2021). This approach highlights a principal's commitment to continuous improvement where a broad and holistic conception of data is used as the basis for making relevant and sustainable improvements to the school community. Elmore (2000) summarizes this point: "Organizations that improve do so

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because they create and nurture agreement on what is worth achieving, and they set in motion the internal processes by which people progressively learn how to do what they need to do in order to achieve what is worthwhile" (2000). While school improvement planning often begins with a formal plan, it must be oriented around a shared commitment to setting high expectations for student learning as the basis for improvement efforts.

Administrators can also emphasize the domains of student learning that are measured by standardized test scores that go into the SIP, while also emphasizing what such measures overlook. Within this context, a needs assessment can be used to explore the values, priorities, and needs of the school community beyond a narrow focus only on standardized student achievement test scores (Klar & Brewer, 2014). This self-study can also be used to identify assets within the school and community (Hollingworth et al., 2018).

### **Maintain Shared Ownership for School Improvement**

Maintaining shared ownership over student outcomes, as evidenced through student outcome data, is a first step in promoting shared responsibility. At best, leaders can emphasize data use as “something that is done by the school and for the school” as opposed to “something that is done to the school” (Sutherland, 2004, p. 289), or as Wayman and Stringfield (2006) write, “*use* data rather than *be used* by data” (p. 569). This emphasis frames data use as relating to collective responsibility (Datnow et al., 2012; Wohlstetter et al., 2008). With this approach, data use provides an opportunity to reflect and learn about how to better meet students’ needs. Accomplishing this goal might require greater participatory leadership in efforts to articulate shared expectations about how different forms of data should and should not be used throughout the district or school (Daly, 2009). Such efforts can clarify what “counts” as data and disentangle



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the data used for accountability rather than improvement purposes, thereby reducing dissonance and distrust that have plagued data use efforts in many districts.

Central leaders' expectations for the use of data shape how principals use data in their schools (Roegeman et al., 2018). Central leaders can also demonstrate that they are committed to learning from and with principals (Honig et al., 2009; Pak & Desimone, 2019). Documenting the ways in which district leaders have used principal feedback and other forms of data to make substantive changes to district policies and programs may further help to build trust. Inviting researchers to study district initiatives is another way central leaders can demonstrate a commitment to continuous improvement.

Regardless of the district context, principals can still take steps to create cultures of more expansive data use within their schools. Principals can frame data use not simply as a matter of compliance but model how to use data to make meaningful changes in school operations and support teachers in using data to improve their instructional practice (Anderson et al., 2010; Farrell & Marsh, 2016). As we discuss in greater detail below, extending the data sources considered valid for data-based decision making beyond test scores can help broaden what can be an overly narrow view of data (Farrell & Marsh, 2016). It can help promote a broader vision of student learning and development as is often conveyed by test scores alone.

### **Using Data to Promote Equitable Student Opportunities and Outcomes**

While educators have long been aware of educational disparities in their classrooms, the disaggregation of student data by race/ethnicity, economic disadvantage, English learner status, and exceptional student education (ESE) status has brought attention of various student achievement gaps to the forefront. Discussions around how to remediate achievement gaps, whether between racialized minorities and white students or economically disadvantaged and

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privileged students, are now prominent in discussions of student achievement data (Flores & Gunzenhauser, 2021). Although some educators express concern that disaggregating student data by demographic characteristics is “discriminatory and contradictory to the tenet that they have high expectations of all students” (Roegman et al., 2018, p. 576), this data use routine marks an important tool to better understand and redress students’ barriers to accessing a high-quality education (Lasater et al., 2021; Myers & Finnigan, 2018). Thus, on the surface, this shift towards a greater attention to achievement differences seems to be a positive development. Yet, researchers have cautioned that the focus on disparate student outcomes risks overlooking the effects of unequal societal and educational conditions that shape these outcomes – the so-called “opportunity gap.” Bertrand and Marsh (2021) write that “data use does sometimes promote better and more equitable outcomes, especially when educators start from the premise that all students can succeed and that the purpose of analyzing data is to find ways to help them do so.” While by no means exhaustive, we illustrate some ways in which school and district leaders can challenge this mentality and advance equity through data use.

### **Reframe Data Use for Equitable Student Opportunities**

School and district leaders’ efforts to use data routines to promote more equitable student opportunities begin with a commitment from district leaders that understanding and redressing historically marginalized students’ barriers to accessing a high-quality education is a central district priority (Myers & Finnigan, 2018). Equity audits are one data-driven tool that can be used to accomplish this aim. Equity audits are used to identify gaps in equitable student opportunities and outcomes that exist in school districts (Brown, 2004; Capper & Young, 2015; Dodman et al., 2019; Skrla et al., 2009). Examining disaggregated data in student outcomes and educational opportunities mark an important first step to identifying disparities and addressing

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underlying barriers to educational equity. As we describe below in greater detail, framing the purpose and interpretations of this data is critical so as not to reinforce structural inequalities. Most importantly, equity audits are a precursor to explicit, distinct, and robust equity plans, whereby central leaders set goals as to how they will work to equalize student opportunities in the district. While there are positive examples of the development and use of equity plans (e.g., Pinellas County Schools' Bridging the Gap Plan), the current research base is limited to small-scale case studies, none of which have documented the relationship between equity plans and student outcomes (Blayaert, 2011; Brown, 2010; Bustamante et al., 2009).

Above, we described how school and district leaders play a critical role in establishing a positive data use culture. This strategic framing of data requires distinct steps when the goal is to create equal opportunities for all students to learn. As the first step in the continuous improvement process is to identify problems, when directed towards lower-performing student subpopulation data use routines can reinforce deficit thinking within schools (Bertrand & Marsh, 2015; Lasater et al., 2021). That is, educators might attribute differences in student performance to students' cultural, linguistic, or familial background rather than structural inequities (Bertrand & Marsh, 2021). Such an approach can obscure the ways in which school and societal practices reinforce and contribute to broader inequities, thus failing to identify the ways in which schools can improve practices that better meet the needs of these student subpopulations.

Similarly, the use of student characteristics to explain student performance can reinforce a culture of low expectations (Bertrand & Marsh, 2015). Making assumptions about students' academic abilities based on their background can make it difficult to use data for improving their instructional practice. Instead, data can confirm pre-existing beliefs about the academic potential of certain groups of students, which can become stratified by race, class, language background,

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or student exceptionalities. Marsh and Bertrand (2021) write, “Instead of reflecting on their own classroom instruction or asking what the school could do to support those children more effectively, many teachers were quick to conclude that the children were themselves to blame for their performance, by virtue of their categorization.” When teachers attribute student performance to factors outside their purview, it can be difficult to engage in the reflective practice whereby teachers might better understand how they or other school staff can help with their students’ development. In other words, such an approach to data use can undermine efforts to promote collective responsibility (Datnow et al., 2012; Wohlstetter et al., 2008).

To ensure that data use routines do not fall into these patterns and reinforce structural inequalities, researchers recommend a couple of steps on how to reframe data use as the basis for providing more equitable learning opportunities. First, rather than focusing narrowly on achievement gaps, school and district leaders should intentionally reframe discussions on the need to address disparities in opportunity gaps (Park et al., 2013). The term opportunity gap has been introduced to refer to the arbitrary circumstances of a child’s background that shape their life chances (Milner, 2020). This shift in focus allows educators to identify the structural and cultural changes that can be made in their schools or districts. That is, using data to identify inequitable educational opportunities can focus energy and resources on concrete steps that educators can take to alleviate historic patterns of marginalization in schools (Roegman et al., 2018).

Second, school staff can place additional emphasis on student growth as opposed—or in addition to—student performance levels. For instance, schools can not only recognize the highest performing students but those who have made the most growth, whether in terms of grades or other assessments. The importance of shifting the focus away from performance levels is

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grounded in a larger research base that points to the ways in which labeling children (e.g., “low”, “middle”, “gifted”, “ESE”, etc.) can overlook strengths and impact student motivation (Datnow et al., 2018).

Third, as important as data can be in driving school improvement efforts, much of the character of a school cannot be measured. To assume so is to distort the realities of any school system. Highlighting the broader educative mission of the school can help overcome the myopia that can accompany data use routines. For historically marginalized groups, this broadening of focus can attend to the ways in which past and present inequities shape the educational opportunities students receive, inequities that are often not adequately captured in commonly used measures of school success.

The role of framing is also important when school leaders work with teachers engaged in data inquiry cycles. School or teacher leaders can confront deficit language when it arises and redirect conversations to student assets (Park, 2018). Datnow and Park (2018) suggest the question, “What did the student do well?”, to be a simple way to shift the conversation away from frustrations around low-performing students to the learning skills that were demonstrated. Another strategy for highlighting students’ assets, which we discuss in greater detail in the next section, is to use multiple sources of data when discussing students’ progress in school. It is important that student data profiles focus not only on student outcomes but opportunities they were provided as well (Myers & Finnigan, 2018).

More broadly, data use routines might need to be paired with other supports that can provide important historical context of the factors shaping differences in student performance (Bertrand & Marsh, 2021; Myers & Finnigan, 2018). The overarching goal of these additional framing activities is to shift the focus away from blaming students or focusing on their supposed

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deficits to instead work with educators to identify what they can do to improve their instruction (Bertrand & Marsh, 2015).

### **Broaden What it Means to Use “Data”**

Most educators would acknowledge that achievement tests—whether state assessments, district benchmark assessments, or common grade assessments—offer a limited view of student learning. Too often, student learning or even intelligence are equated only with their test scores. As we described above, school and district leaders play an important role in promoting a more expansive view of children and adolescent’s academic and social development.

School and district leaders can push back on this narrow conception of data and broaden the types of data that are used and considered valid. In most school districts, data is typically assumed to be only quantitative. Yet, nonnumerical data often provides important texture regarding students’ experiences in school. Datnow and Park (2018) describe how administrators in one school shadowed failing students, which brought important insight into how schools did and did not meet the needs of these students and how school personnel could better connect them with educational resources. Student focus groups are another tool by which school and district stakeholders can learn about students’ perceived barriers to learning, although this approach appears to be underused in practice.

Efforts to broaden the types of data used about students’ experiences are particularly important for historically marginalized students. One approach is to overcome the narrow focus on achievement tests is to create individual student profiles, which supplement assessment data with data on grades, attendance, student behavior, and student-reported information (e.g., professional goals). This asset-based approach, which is increasingly used within the context of a multi-tiered systems of support, allows educators to develop a more complete portrait of a

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student that can help in better meeting their academic, socioemotional, and behavioral needs (Datnow & Park, 2018).

Another emergent approach is to give students more involvement in managing data related to their learning. Depending on the level of the students, this increased personalization of student data could include student data notebooks for students to monitor their own data. While there is little research that speaks to how well students are able to manage their data to support their learning, Halverson (2018) has suggested that data systems will increasingly be designed to not only support teacher learning but students as well.

The use of multiple forms of data is also of particular importance when making decisions about the grouping of students within classes and student assignment decisions for special services and advanced courses (Park & Datnow, 2017). Historically and into the present, instructional grouping and tracking have limited the provision of rigorous academic programs for low-income students and students of color (Oakes, 2005). The use of student achievement scores as the sole determinant of assignment decisions is not only a misuse of the assessment but overemphasizes a narrow measure of student performance (Datnow & Park, 2018). It can also exacerbate racial/ethnic disparities in high-quality educational opportunities within schools. As a result, multiple data sources should inform high-stakes decisions. Fortunately, an increasing number of districts have taken steps to improve access to gifted programs and advanced academics by modifying how students are considered for access to these opportunities (e.g., Card & Giuliano, 2016).

Finally, district administrators may need to evaluate the extent to which data dashboards mirror student identities in valid and accurate ways. For instance, it is a common practice to disaggregate student data by race/ethnicity in ways consistent with federal reporting categories

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(National Forum on Education Statistics, 2016). These reporting categories may overlook aspects of Florida's racial/ethnic diversity, such as students who identify as Afro-Caribbean or subpopulations of racial/ethnic groups. In addition, disaggregating data by multiple marginalized groups may yield insight into the ways in which school systems can better meet the needs of specific subpopulations. In short, steps can be taken to ensure that data reports accurately reflect student bodies to clearly understand students' unique learning needs.

### **Connections with the Other Conditions**

The Five Conditions are pillars to support great teaching at scale; they interact and support the enactment of the other conditions. The effective use of data depends on capable and empowered instructional leaders at all levels. Goals established in school improvement plans and district strategic plans should be informed by data and operationalized in a way that they can be consistently monitored using data. Additionally, using data, either within the context of the continuous improvement framework or to identify problems, can help school and district leaders proactively identify areas of improvement.

Data use intersects with professional learning and the use of high-quality instructional materials in unique ways. In-depth professional development on data use appears to be a necessary condition to promote consistent data use. At the same time, data use is increasingly a part of collective teacher inquiry. Teachers use data to understand how they can re-teach core concepts, either individually or collectively. Data use can also inform the ways in which teachers may need to adjust their instruction to better meet student needs. It can also help teachers adapt and differentiate instructional materials in ways that can help students gain mastery in each skill.



## Next Steps for Research Around the Condition

This review also left important unanswered questions for research. One of the most important questions uncovered by this review is if teachers have the right kind of data. Despite having ever increasing forms of data, questions remain about whether teachers have the training and collect data in their classrooms that would best support instructional improvement. In other words, how can data on teacher instructional practice supplement the current focus on outcome data?

Second, research that can help to understand how data is being used to inform a broader suite of school decisions is also needed. As an example, despite the central role of data in multi-tiered systems of support, we did not identify research that spoke explicitly to the ways in which data was used to inform decision-making within these models.

There are also opportunities for researchers to study how data is used to promote equitable student opportunities and outcomes. At the district level, it is important to understand the extent to which the use of equity audits and equity plans is associated with improved educational opportunities and outcomes among historically marginalized groups. At the school and classroom level, researchers can continue to explore how educators' pre-existing beliefs shape how they are analyzing data, with particular attention to the ways in which data use can reinforce deficit thinking within schools.

Finally, data systems are increasingly being designed in ways that support greater engagement from students themselves (Halverson, 2018). While there is a strong conceptual justification for personalized supports such as these, there is not strong evidence on whether providing students with tools to monitor their own data is helpful.

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