Organizational Problem Solving and School Discipline: Comparing the Roles of Schoolwide Behavior Management Technologies

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Introduction

School leaders are charged with many responsibilities, not the least of which includes ensuring that school environments are safe, orderly, and positive (Hitt and Tucker, 2016). This work, however, has grown more complex. Conventional practices, such as strict adherence to codes of conduct and punishment (e.g., out-of-school suspension), are increasingly understood as exacerbating inequities associated with race, gender, class, and sexual identity (Annamma *et al.*, 2019; Meiners, 2011).

Consequently, many leaders have turned toward technological solutions, such as electronic behavior management platforms (eBMPs), to promote positive and orderly school environments (Riden *et al.*, 2019). A key feature of these systems is their support of token economies, which involve assigning merits or demerits to students throughout the day based upon their behavior. Token economies have been especially popularized by movements toward Positive Behavior Interventions and Supports (PBIS) and other tiered support models (Lane *et al.*, 2014; Sugai *et al.*, 2012), thus providing behavior management platform developers a wave to ride on. For example, Williamson (2017) provides a history of the ClassDojo platform, arguing that its adoption by over 3 million teachers in over 180 countries was due to having played to the PBIS discourse, rather than sound science or pedagogy.

To date, scholarship about behavior management platforms has largely focused on their classroom-level implications (e.g., Riden *et al.*, 2019; Robacker *et al.*, 2016). This ignores their potential schoolwide implications, despite the importance of organization-level work to resolving disciplinary inequities and promoting positive behavior (e.g., data analysis; collective problem solving; collaboration with families) (Gregory *et al.*, 2017; Sugai *et al.*, 2000). This gap is notable, because the distribution of information schoolwide can facilitate collaboration toward

remedying schoolwide inequities (e.g., disproportionate referrals to Special Education) and collaboration with families (Wayman *et al.*, 2008). In this way, collaborative problem solving differs from working in isolation or focusing on individual, classroom-level challenges. Rather, educators who collaborate using systems-level data can better design systemic changes (e.g., strategies to prevent high school dropout; increasing college readiness) (Supovitz *et al.*, 2012). Until now, research has not addressed whether or how non-academic data, such as those found in schoolwide behavior management platforms (e.g., LiveSchool; Kickboard), might foster organizational problem solving.

Thus, this comparative case study explores organizational problem solving at three schools using schoolwide eBMPs. We were guided by two research questions. First, how do educators use eBMPs for organizational problem solving? This question focuses on changes in classrooms or among education professionals. Second, how do educators use eBMPs to collaborate with families? This question acknowledges that families may help address challenges in schools. Accordingly, this study cuts across various under-researched topics in school technology leadership, including: data-informed decision making, promoting safe and positive environments, and enhancing connections with families (Dexter *et al.*, 2016). Accordingly, it provides new knowledge about electronic behavior management platforms and school improvement, as well as considerations for leaders hoping to leverage such technologies.

Background

In what follows, we first provide some background regarding electronic behavior management platforms. Subsequently, we use an organizational learning lens to conceptualize about platforms' potential to support organizational problem solving.

Electronic behavior management platforms

According to Riden et al. (2019), electronic behavior management platforms (eBMPs) are internet-based applications designed to assist in popular classroom management practices, including the application of token economies, contingent praise, and sharing of performance feedback (Maggin *et al.*, 2011; Robacker *et al.*, 2016). Many of these practices are also found in more comprehensive behavior models, such as applied behavior analysis (ABA) and Positive Behavioral Interventions and Supports (PBIS) (Cooper *et al.*, 2019; Sugai *et al.*, 2012). Even so, Williamson (2017) cautions that such connections are tenuous at best, and that vendors are more interested in pleasing the marketplace than conforming to these or other related disciplines (e.g., child development, learning sciences). For instance, Kickboard distributes whitepapers marketing their product as useful for PBIS, social emotional learning, and even "data-driven restorative practices" (Kickboard, 2018).

Behavior management platforms share many similarities. Teachers are presented with a student roster, adding points for positive behaviors (or subtracting points for misbehavior). Computerizing this work brings new capabilities (MacSuga-Gage *et al.*, 2015; Riden *et al.*, 2019). For example, some teachers might pepper the classroom with notification chimes for each reward. Rewards can be distributed instantaneously and continuously throughout the day, not only to specific students but also to entire groups (e.g., entire classrooms; grade levels in the cafeteria). These might additionally be associated with automated messages to students' families and other staff. Yet other teachers might publicly display individual students' points via smartboard, thus allowing them to see how much they (or their classmates) have been earning. For example, ClassDojo allows students to design their own monster-like avatars for this purpose. Ultimately, students may spend their points at the school store (e.g., pizza party). Presumably, teachers using these technologies also engage in other non-technological practices,

such as explicitly teaching target behaviors and reflecting about the underlying causes of particular misbehaviors (Riden *et al*., 2019).

Nascent reports about these platforms have been optimistic, though not conclusive. For example, two teacher action-research studies have exhorted the benefits of ClassDojo (Chiarelli *et al.*, 2015; MacLean-Blevins, 2013). Each, however, focused on only a single classroom over the course of a few weeks, drawing potentially spurious conclusions about effects on student motivation and discipline based upon teachers' simple tallies of misbehavior. Similarly, Sanchez *et al*. (2017) argue that the ClassCraft platform enhanced student engagement, motivation, and collaboration. However, the methodologies employed in this study were ambiguous and potentially flawed. For example, two teachers (both co-authors of the study; one of whom also founded the company) provided data for classroom use cases, but it was unclear how these data were collected or analyzed. Additionally, it was unclear how data from a survey of 227 teacher users were analyzed. At best, these studies provide only anecdotal accounts of platforms' benefits.

Although a technical report, Barrett and Harris's (2018) quantitative analysis of disciplinary data from approximately 70 Louisiana schools was larger in scale. It found that Kickboard adoption was associated with decreases in out-of-school suspensions, but was limited in that it operationalized Kickboard use dichotomously (presence or absence of system). Thus, it was unable to reveal what practices led to specific outcomes. Unfortunately, this paucity of empirical scholarship reflects how classroom management research has kept little pace with technological advancements in schools (Cho *et al.*, 2020). Although the studies above are suggestive, the present study addresses a need for research on how these platforms may affect classroom- and organization-level (e.g., among teachers or with families) practices.

Organizational learning and problem solving

As behavior management platforms become increasingly popular, it is important to theorize about the potential contributions of such technologies on school improvement. In the language of organizational learning, school improvement involves using new ideas or information to change policies or practices (Seashore Louis, 2006). Importantly, new technologies can bolster organizational learning by enhancing the storage, distribution, and analysis of new information (Nonaka *et al.*, 1998; Schechter, 2008). For example, schoolwide data systems can facilitate supports for individual students, strengthen instruction, and remedy educational inequities (e.g., Wayman *et al*., 2008).

Thus, problem solving can be understood as the engine to organizational learning. When educators problem solve, they identify and seek to improve mission critical policies or practices. However, what people identify as problems (or solutions) is socially constructed (Irby, 2018; Schechter, 2008). Actors' values, contexts, experiences, and mental models influence what gets seen and what gets done. Leaders can shape problem solving by increasing information access and providing resources or direction for collaborative inquiry (Marsh and Farrell, 2015; Supovitz *et al.*, 2012).

In this light, it is helpful to distinguish between differences in how problems are framed and addressed. One such distinction concerns first-order and second-order problem solving (Cho, 2016; Tucker *et al.*, 2002). In first-order problem solving, organization members handle challenges largely in isolation (e.g., troubleshooting individual classrooms). Although "putting out fires" this way may seem rewarding, it does not fix the overarching system. In contrast, second-order problem solving involves collaborating toward big picture remedies, rather than piecemeal improvement.

Although organizational theorists emphasize the exchange of ideas during problem solving, attention has centered on collaboration among education professionals (Schechter, 2008; Seashore Louis, 2006). This focus fails to account for calls from discipline researchers to include families as collaborators in framing and addressing problems (Gregory *et al.*, 2017; Sugai *et al.*, 2000). For example, Oliva and Alemán (2019) describe how Latinx mothers played key roles in identifying problems in school discipline practices and responsiveness to students' cultures. Their advocacy helped frame problems for educators, as well as whether their responses would be first- or second-order.

Finally, behavior management platforms may facilitate organizational learning by providing educators and families with previously unavailable data and analyses. Although educational scholars have long argued that behavioral, and not simply academic, data should play a role in addressing educational inequities and school improvement (Irby, 2018; Sugai, 2000; Wayman *et al*., 2008), research about how technologies may facilitate such processes has not kept pace with their widespread adoption. Such tools may foster information sharing and collaboration not only among educators, but also with families, thus offering new insights into problems and potential solutions.

Methods

Employing a qualitative multiple case study design allowed us to examine problem solving practices among educators and with families at each school. Below, we describe the study sites and our data collection and analysis procedures.

Study sites

The three study sites[1] were in different locations in the Northeastern United States and selected to provide variation in site characteristics, especially in terms of sector (i.e., public/charter), grade levels, and student demographics (see Table 1). Such variations support the analytic generalizability and external validity of case studies by allowing the analyst to examine how phenomena may transcend contexts (Merriam and Tisdell, 2015; Yin, 2009). In terms of platforms, two schools used LiveSchool, while the third used Kickboard. Both platforms allowed schools to customize their merit/demerit systems to their respective discipline models and to assign merits/demerits in real time. Additionally, both systems technically afforded analyses about behavioral data and reports to students' families. However, our findings will describe how schools differed in such practices. Below, we provide additional school background information.

[INSERT TABLE 1 HERE]

Stark Middle School. Serving approximately 300 students across grades 6-8, Stark Middle School was located in a medium-sized urban city. Demographically, approximately nine out of ten students were classified as Hispanic, with even higher numbers classified by the state as having "high needs" (e.g., students with disabilities; English language learners). Unlike the charter schools in this study, Stark was part of a public school district. Additionally, although it was not officially a turnaround school, it had recently been reorganized to preempt state takeover and faced similar pressures.

Stark had originally adopted LiveSchool to replace the paper tickets initially used in its token economy. Like the other schools in this study, Stark structured its token economy around

[1] Pseudonyms are used for all sites.

its mission and core values, encouraging students to be: Productive, Accountable, and Kind (PAK). Because Stark's mascot was the wolf, these values were known as the Wolf PAK.

Compass Academy. Compass Academy was a charter school in a large urban city and was partitioned into three grade-level groups: the lower school (grades 5 and 6), middle school (grades 7 and 8), and high school (grades 9 through 12). It enrolled approximately 700 students across all eight grades. Demographically, approximately half of all students were classified as white and about one-third as African American/Black. Additionally, nearly half were classified as having "high needs." In general, Compass's token economy and detention system was grounded in its core values: Mindfulness, Achievement, Perseverance, and Professionalism (MAPP). Compass used LiveSchool to track and manage these merits and demerits according to these values.

*Riverside Charter***.** Serving approximately 300 students in kindergarten through fifth grade, Riverside Charter was located in a small city. Demographically, nearly half of students were classified as Hispanic and about one-third as white. Approximately three-quarters were classified as having high needs.

At first glance, Riverside's overall discipline model seemed like the other schools. For example, Riverside espoused certain core values as part of its token economy (i.e., discipline, grit, integrity, collaboration, and zest). However, the similarities stopped there. For example, Riverside's flagship reward was "Friday Choice Time." Near the close of day on Fridays, students were given "paychecks" reporting their net points for the week. Top earners won top choice for activities (e.g., physical education, music, art, or Spanish class).

Data collection

To gather a broad range of perspectives, interview data were gathered from school leaders (e.g., principals, assistant principals, deans, counselors) and teachers of various grade levels and subject areas. In total, 34 educators participated in individual interviews (seven leaders; 27 teachers) (see Table 2 for participant characteristics). These interviews took place at the school sites (i.e., administrators' offices; teachers' classrooms) for approximately 40 minutes each and followed the same semi-structured protocol (Merriam and Tisdell, 2015).

The development of the interview protocol was informed by prior research relating to technology, data-informed decision making, and classroom management (e.g., Cho *et al.*, 2020; Wayman *et al.*, 2008). Lines of inquiry included: the perceived benefits and drawbacks of eBMPs, educators' uses of and collaboration involving behavioral data, and interactions with students' families. Data collection at Stark took place in fall 2016, where nine teachers and four leaders were interviewed (13 total). Subsequently, the study expanded to the remaining study sites in fall 2017. At Compass, 11 teachers and one leader were interviewed (12 total), while at Riverside, seven teachers and two leaders were interviewed (9 total). When aggregated across the three schools, most educators were female (n=21; 62%).

[INSERT TABLE 2 HERE.]

Data analysis

Data analysis progressed in phases. During the early phase, each school's interview transcripts were reviewed. To strengthen the validity of later analyses (Merriam and Tisdell, 2015), memos summarizing preliminary findings were shared with educators at each school. Meeting participants included those who had and had not originally participated in interviews, which helped to strengthen and triangulate our impressions.

Subsequently, formal analysis was conducted by the lead author and co-authors, who were doctoral graduate assistants during separate years. This process was structured following Hill *et al*.'s (1997, 2005) recommendations for collaboratively coding qualitative data. To begin, the lead author and a co-author read the same transcript independently. In doing so, each added jottings or "open codes" that summarized participants' statements and phenomena, constantly comparing each code to prior ones (Merriam and Tisdell, 2015).

Subsequently, the two analysts convened to develop a consensus-level coding of the transcript. The analysts took turns leading conversations about excerpts, codes, and the rationales for codes. Even when agreeing about categorizations, underlying rationales were compared and openly discussed. This helped to strengthen team consensus and refine the data dictionary. This approach aligned with Hill *et al*.'s (1997) insistence that differences of opinion lend a productive friction that should be prioritized over outright agreement and was even threatened by quantifying interrater agreement (p. 524). Thus, although we did not formally quantify interrater agreement, coding had stabilized (over 90 percent agreement) after coding approximately one third of the transcripts. At that time, we began coding independently, fully auditing each other's transcripts, then discussing instances of discrepancy or ambiguity. The final code list addressed issues related to our research questions, including: educators' uses of eBMPs; collaboration and data use; and interactions with students' families.

In line with our research questions, we then used these codes to develop within-case portraits of each school, focusing on platforms' roles in collaboration, problem solving, and interactions with students' families. Next, a cross-case analysis was performed, examining patterns in themes across schools. This included not only commonalities among schools, but also how contextual differences may have influenced outcomes or routines (Yin, 2009).

Within-case findings

This study explores collaborative problem solving at three schools. Below, we provide case portraits for each school. In general, these are organized according to how education professionals engaged in first-order problem solving (i.e., troubleshooting) and in second-order problem solving (i.e., collaborating with colleagues toward systemic solutions). However, educators at one school (Riverside) did not discuss second-order problem solving. Because organizational theorists have focused on employees, and because collaborative activities involving families differ from collaboration with colleagues, findings involving families are provided in their own subsection.

Stark Middle School: Problem solving around classroom management

Stark was enthusiastic about LiveSchool, using its data to focus on classroom management practices. Describing its benefits, one school leader touted that out-of-school suspension rates had dropped from 91 at that time in the prior year, to only 20 in the current year.

*First-order problem solving at Stark***.** First-order problem solving involves attempting to address immediate issues. LiveSchool facilitated this kind of problem solving by storing and distributing teachers' behavioral records and qualitative notes. Such notes were useful during teachers' formal and informal counseling of students (i.e., weekly advisory periods; student support group meetings). For example, one teacher described how she would unpack a week's ups and downs with students, praising behaviors like success on an assessment or class participation. She would also attempt to unpack an "off" day or "rough week." In her words, "That's our opportunity to get on the computer and check in. See if you got 50 demerits in the past week – what's going on? Is something changing… Is something going on at home?"

Similarly, other teachers checked LiveSchool data before class to identify whether a student might benefit from support or deserve public recognition for an earlier accomplishment.

Additionally, turning toward friends for advice is a form of first-order problem solving when those conversations are not geared toward systemic solutions (e.g., Tucker *et al*., 2002). At Stark, this form of first-order problem solving took the shape of quick "check-ins" among teachers. Since LiveSchool provided teachers information about students' daily behavior in other classes, teachers found it helpful to ask their colleagues for background or "clarification" about students' behavior. These check-ins also included quick troubleshooting (e.g., "Try giving Ricky five points right away in class, instead of waiting for him to get a demerit.").

Finally, we noted one example where first-order problem solving may seem beneficial, but also risks becoming unsustainable. One school leader visited classrooms for check-ins with students whenever she received instant notifications about demerits via LiveSchool. Some days, this meant putting out fires "back-to-back-to-back-to-back, running around alike a crazy person." In this example, it is possible to envision how first-order problem solving (immediate, on-the-spot intervention) could feel gratifying, yet still fail to create systemic solutions.

*Second-order problem solving at Stark***.** LiveSchool and its adoption led to various forms of second-order problem solving. This began even before its implementation. Specifically, Stark educators recalled how their work had begun with "personalizing" LiveSchool to Stark's values (i.e., Wolf PAK). At an organizational level, this meant addressing the challenge to be "consistent" and "fair" by calibrating expectations about student behavior. As one teacher explained, "It's not an arbitrary thing anymore… Now we've got six or seven behaviors for being productive. We have six or seven behaviors for being kind. We have six or seven behaviors for being accountable."

Subsequently, Stark turned toward fostering positive behavior at an organizational level. For example, some teachers were "struggled" with classroom management. LiveSchool data revealed how these teachers relied disproportionately on demerits and punishment. To address this problem in second-order ways, teachers decided to have direct "conversations on a professional level" with each other. This went beyond simply turning to a friend. Rather, experienced, successful teachers shared useful strategies with struggling teachers and made plans for how teacher teams might lend support. As one teacher elaborated, "We want to make sure that our positive-to-negative ratio is pretty high. What can we do to change the behaviors? What can we do to facilitate you focusing more on the positives?" Such conversations were unanimously described as productive, rather than punitive.

LiveSchool data also helped leaders address organizational issues. For example, they recounted feeling better prepared to supervise and support teachers. In doing so, they would consider both raw data and teachers' unique contexts, which might range from being the "brand new teacher trying his best" to the physical education teacher plagued by "kids bouncing basketballs" after line-up time. Recognizing these distinctions helped leaders attune their dialogue with teachers, their classroom observations, and suggestions about how to apply rewards or decide to assign detention. Additionally, leaders developed interventions for students by jointly analyzing LiveSchool and academic data. They aimed to identify "factors affecting the student's progress or lack thereof," including time of day, particular subject areas, certain teacher personalities, or approaches to offering rewards. In doing so, they could help adjust the system of structures and routines surrounding students.

*Collaborating with families at Stark***.** LiveSchool helped educators and families work together to strengthen the net of relationships and supports around students, thus supporting

second-order problem solving. In particular, educators found it helpful that families could access LiveSchool and receive automated email notifications and qualitative notes about student behavior. As one leader lauded, "Once they're in, they're in. Getting the app is easy, and it's free, and it's great." Stark educators asserted that providing families more information created a "foundation" for working together. In their words, caretakers could know "exactly what's going on" so that they could "collaborate around solutions." As such, access to information smoothed collaboration. For example, one teacher recounted calling the home of a student, only to realize that the caretaker was already prepared to intervene, stating, "Oh, I already got the email. I'm on it. I'll talk to [the student]." At other times, families initiated follow-up because of LiveSchool. For example, another teacher described how one caretaker regularly contacted him to discuss how all parties might support that student. "Every time [LiveSchool] dings, I'll get an email: 'Mr. North, I saw that Robbi did 'this.' Is everything okay?' I talk to that mom more than I talk to my own mom!"

Compass Academy: Equity-focused problem solving

Like Stark, Compass Academy was also positive about LiveSchool. Unlike Stark, however, Compass focused much of its problem-solving on ensuring that school discipline practices were more equitable.

First-order problem solving at Compass. Compass educators reported using qualitative notes about students in LiveSchool for first-order problem solving. As at Stark, this included troubleshooting issues with students. For example, Compass teachers referenced LiveSchool data when discussing how to better engage particular students. Additionally, they liked referencing LiveSchool before class, because it helped them "proactively" engage students who were having a "rough day." Furthermore, Compass teachers incorporated LiveSchool data into student

advisory periods, using them to "check in" with students directly. Indeed, because students were sometimes unaware of their points or if they had detention, teachers considered it important to give individual students "rundowns" of LiveSchool data, throughout the day, even outside formal advisory periods. Additionally, these conversations allowed educators to praise students' desirable behaviors such as about arriving to class on time and prepared.

Second-order problem solving at Compass. Inequitable discipline practices were a key focus of second-order problem solving at Compass. This focus was rooted in a "galvanizing moment" two years prior to data collection, when LiveSchool data revealed that students of color in one grade level had been disproportionately punished. Recounting his shock at the time, one teacher described how students of color had received "somewhere on the order of three times as many demerits as their white counterparts" in a single month. As another teacher said, "We couldn't hide from [LiveSchool] data; we had to address the issues that we had."

Subsequently, Compass leaders took steps to reshape teacher practices. For example, leaders organized events where teachers worked in teams to identify trends in the data. Leaders also periodically broadcast summaries of LiveSchool data via email. Consequently, teachers confessed habitually "checking" data for patterns of inequity, even outside formal meetings. Overall, teachers saw these routines as helping them to be more "fair," "consistent," and "level-handed." In line with the school's discipline model, middle- and lower- school teachers framed this in terms of having a "good number" or "ratio" of merits to demerits, while high school teachers focused on avoiding inordinate demerits only. One lower-school teacher described the reflection process thusly:

Is it our girls? Is it our boys? Is it a group of color? Is it our white students? Is it students on free or reduced lunch? Then we try to also look at who is earning the most merits and demerits, and the fewest merits and demerits. What do those patterns tell us?

In their words, this "changed mindset" led to school policy changes. For example, when middle school teachers realized that certain students were missing out on a Friday reward due only to a particular and isolated demerit (i.e., forgetting their pencils on Monday mornings), they adjusted their reward policies. Other changes were also made relating to dress code, missing homework, and tardiness. These changes were seen as being more sensitive to students' unique contexts.

Collaboration with families at Compass. Unlike Stark, Compass had not enabled LiveSchool's instant notifications for families. When asked about this practice, Compass educators, including one leader, did not know that such communication was even possible. Nonetheless, six participants directly lamented caretakers' lack of LiveSchool access. As one lower school teacher explained, without access to LiveSchool reports, "Parents don't necessarily see all the positive things that kids are doing. They only really hear about the demerits if they ask or if a teacher takes initiative." In their view, lack of automated messages directly impeded collaboration with families.

Lacking access to new information potentially limited problem solving with families to first-order, transactional issues. For example, Compass teachers and leaders mentioned how it was useful to refer to LiveSchool data (records of positive or negative behaviors) during phone calls or conferences with caretakers. Similarly, they reported that caretakers would sometimes call or come to school to ask why their student was assigned detention. In such instances, the qualitative notes in LiveSchool served as a source of institutional memory, helping educators

answer questions regardless of whether they taught the student. As one lower school teacher explained:

> If a family calls, literally any adult can log into the system at school and say, "This is when the demerit happened. This is why. This is who logged the demerit." It's just easier to communicate with families about things that happen not in your class.

Riverside Charter: Minimal problem solving

Problem solving practices at Riverside Charter stood in contrast with the two other schools, despite Kickboard's integral role at the school. Every teacher we spoke to described using Kickboard throughout every day and every week—however, teachers also reported not being expected to reflect upon the data. Confirming this, a leader described data use as an "area in which [Riverside] needs to grow." Thus, first-order problem solving at Riverside was minimal, and teachers did not report examples of second-order problem solving.

First-order problem solving at Riverside. When asked, teachers reported that examining Kickboard data occurred rarely, if ever. As one teacher summed, "It's not something I would do." Teachers who did reflect about Kickboard data did so on special occasions (e.g., Special Education meetings; a specific student putting up "red flags;" an upset). In these cases, teachers described considering ways to be more positive with a student or offering students opportunities to "earn back" points after they had been demerited. Additionally, two teachers mentioned having informal "break room" conversations with colleagues about student behavior. However, these involved becoming more "aware" of students' troubles, rather than uncovering causes for behavior or developing strategies to address them.

Although Riverside educators did not report engaging in second-order problem solving with colleagues, they mentioned two examples of first-order collaboration. Both involved the

delivery of Special Education services. In the first, one teacher reported speaking to a colleague who had been assigning a student demerits, although the student's individualized education plan (IEP) forbade the practice. Kickboard helped this teacher say, "Hey, remember so-and-so can't lose any bucks because of his IEP. You've got to change that, because I can't send the check home reflecting lost bucks." In the second story, another teacher noticed that a student with ADHD was consistently penalized for leaving his seat. She described speaking to her colleague about giving the student accommodations (i.e., a wiggle cushion; multiple warnings). In these examples, teachers acted in first-order ways (addressing immediate issues), but did not improve organizational policies and routines.

Collaboration with families at Riverside. Similar to Compass, Riverside had not enabled families to access student data. Unlike Compass, Riverside had a rationale for this decision. This rationale related to the challenge of recording standards-based grades in the traditional online gradebook format found in Kickboard. Because Kickboard served as both a gradebook and behavior management platform, Riverside educators feared that direct access to student data would be too confusing for families. As one leader explained:

> You can't open just the behavior side [to families]. You have to open up the grade side, and we don't want the kids to get caught up in the grades, because we do standards-based grading… We don't want them to get upset over the fact that they have a 40, when we know they're just not there yet.

Given this lack of caretaker access to Kickboard, educators communicated with families in other ways. Whereas one teacher reported personally text messaging caretakers about students' day-to-day behaviors, most used weekly Kickboard printouts (i.e., "paychecks") to inform families about student behavior. These paychecks were a major part of the school's token

economy, which used students' weekly earnings to determine preferential treatment during "Friday Choice Time." Students also brought these printouts home to be signed. One teacher summed, "Parents can see a little bit more clearly what's going on at school. I think that's really nice, the way that parents can dial in on what their kids are doing." Echoing this, one leader described the paychecks as a "great communication tool."

However, this communication was largely one-way and transactional. Leaders did not report engaging in dialogue with caretakers, but rather using paychecks to deliver news. As one leader stated, "We're sending home this paycheck. Your scholar had a really rough week… He made an improvement plan with Ms. West." Similarly, none of the teachers in our sample described discussing specific paychecks with caretakers, though one did speak about a specific demerit with a parent after the student had complained. Altogether, teachers and leaders appreciated how paychecks added a sense of "accountability" for students, such as when caretakers added "special treats" or other consequences at home. As such, our sense was that paychecks served as a first-order way to address behavior, rather than an attempt to work together with families about mutual concerns.

Cross-case findings

The preceding passages have described each school and its respective problem-solving practices. Table 3 provides a cross-case summary of those findings, revealing similarities and differences across schools. Below, we discuss these findings in terms of our research questions.

The roles of eBMPs in organizational problem solving

Research question one related to the ways in which educators used eBMPs for organizational problem solving. One dimension of this question involved first-order problem solving. Although all the schools engaged in some form of first-order problem solving, the use of

behavioral data to inform decisions was most prevalent at Stark and Compass. Educators at both schools engaged in troubleshooting among colleagues, examining data before class, and checking in with students individually. Collaboration was treated as a norm; student advisement was an established part of the school routine. In contrast, Riverside educators only examined eBMP data under special circumstances (e.g., errors in Special Education practices). Indeed, Riverside leaders admitted that analyzing behavioral data was not prioritized.

Moreover, this division between the schools was also evident with respect to second-order problem solving. Stark and Compass leaders were invested in leveraging behavioral data for organizational improvement. Whereas Stark focused on issues of classroom management (i.e., schoolwide expectations; supporting and supervising teachers; planning student interventions), Compass focused on equity issues in school discipline. In contrast, Riverside's leadership had not invested in using data to address organizational or systemic issues. Thus, although technology adoption may support certain forms of problem solving, simply having a system is not sufficient for problem solving to occur meaningfully. In this sense, our findings resonate with prior scholarship highlighting the importance of leaders in helping teachers weave technologies into collaboration and inquiry (Dexter *et al.*, 2016; Marsh and Farrell, 2015; Wayman *et al.*, 2008).

The roles of eBMPs in collaborating with families

Research question two related to the use of eBMPs to collaborate with families. We found that each school took a different approach to providing families with access to behavioral data, and that differences in access seemingly played a role in whether schools and families collaborated. To begin, Stark families received automated, instantaneous messages about their students. These families were described as informed about their students' behavior, and thus

better prepared to brainstorm solutions. In contrast, Compass families did not have system access. They were informed about student behavior if they visited the school or called to ask; this addressed parents' immediate needs, but not systemic issues. Finally, in the middle was Riverside, which used weekly printouts for family communication. Similar to Stark educators, they believed families were more informed; however, similar to Compass, they did not report problem solving with families. At best, they seemed reassured that some students were getting a double dose of rewards and consequences at home.

These findings are in line with research highlighting the importance of transmitting multiple forms of information in several ways (e.g., Carlson and Zmud, 1999; Irby, 2018). In the present study, instant notifications and qualitative notes seemingly enriched collaboration among families and educators. In comparison, less (or less frequent) information seemed less productive. Importantly, how families accessed data was subtly connected to leaders' knowledge and expectations about behavior management platforms. In the cases of Compass and Riverside, what leaders did not know about or did not want from technologies (e.g., sharing gradebooks) had unforeseen repercussions on interactions with families.

Implications

The preceding section summarized findings across cases. Next, we discuss this study's overall implications for practice, theory, and research.

Leadership practice: Focusing on structure

Despite calls to integrate behavioral data into problem solving (Irby, 2018; Sugai *et al*., 2000; Wayman *et al*., 2008), only recently have behavior management platforms made such work feasible. Given that problem solving is an organizational process, the present study provides important considerations for leaders hoping to shape that work. First, this study

highlights how leaders can provide direction for problem solving. Although we were heartened by Compass's use of behavioral data to address inequitable policies and practices, we acknowledge that there is no guarantee that schools will engage in such work. As others have pointed out, it is important for leaders to frame for their faculties the how and why of reforms (Bridwell-Mitchell and Sherer, 2017; Lowenhaupt, 2014). Adding to this conversation, this study shows how basic structures and routines, like student advisory periods or emailing data, can help institutionalize expectations about practice. Just as leaders can enhance the use of academic data by creating time, collaborative space, and a sense of common direction (Marsh and Farrell, 2015; Wayman *et al*., 2008), similar moves may support the use of non-academic data for organizational improvement.

Although leaders are charged with ensuring productive dialogue with families, there has been relatively little research about how they might leverage technologies toward those ends (Dexter *et al.*, 2016). Our findings suggest that behavior management platforms have the potential to spark or support basic communication with families, but that leaders had not carefully considered this potential. In contrast to calls from scholars (Gregory *et al.*, 2017; Oliva and Alemán, 2019), we did not see leaders proactively incorporating the cultures and voices of families in improving school discipline or other schoolwide issues. In considering the present moment, where so many classrooms are now online due to the COVID-19 pandemic, leaders now have a unique opportunity to go that extra mile. Never before have so many caretakers had such intimate access to teachers' instructional practices, classroom management, and positions toward identity and culture. Now is an opportunity for leaders to incorporate families' perspectives into organizational improvement.

Theorizing about technological change and innovation

There are many ways to think about the relationships between technological change and innovations in organizations. Sometimes educators presume that new technology will mean new evolutions in practice (Brooks, 2011; Cho and Wayman, 2015; Hamilton *et al.*, 2016). This technologically deterministic view presumes that innovation results directly from new tools, and thus, that more is often better. Alternatively, socially constructivist views treat such innovations as resulting from how people have made sense of new tools, signals from each other, and their environments (Cho *et al.*, 2019; Leonardi and Barley, 2010). This view makes it possible to better understand why some technology initiatives do not produce change and why some inefficient or counterproductive practices persist.

Whereas conversations about behavior management platforms have focused on their classroom-level uses (e.g., Riden *et al.*, 2019; Robacker *et al.*, 2016), the present study delved into schoolwide systems practices. Although such platforms facilitated some work and allowed some schools to make systems-level changes, what happened in practice seemed context dependent. Importantly, it falls upon leaders to shape context, by applying their own technology knowledge, developing teacher knowledge, and harnessing collaborative culture or other resources (Dexter, 2018). Put differently, the changes that eBMPs might ultimately offer schools might not rest in the tools themselves, but in how leaders leveraged new, productive, and equitable practices.

Limitations and future research

One limitation of the present study was that it relied upon interview data, and thus educators' perceptions and recollections. To enhance this study's validity, we interviewed educators representing a variety of grade levels and subject areas at each school. However, to better preserve participants' anonymity, teachers' specific roles have not been reported.

Additionally, it was not within the scope of this paper to discuss individuals' classroom-level practices. These may provide an additional sense for schools' cultures and discipline paradigms.

In future research, additional methodologies could prove useful to understanding educators' eBMP practices and problem-solving. For example, video-recorded classroom observations, either in person or via video conferencing software could be analyzed. One could take tallies of teacher and student behaviors every few minutes to assess classroom management behaviors, climate, and engagement (Leff *et al.*, 2011). Such instrumentation could be additionally sensitized for issues relating to equity (e.g., biases according to race, gender, or class; parents helping in the background). Further, teachers could reflect about their own videos (Snoeyink, 2010), providing additional information about their classroom management and first-order problem solving. In-person and virtual meetings among teachers, with leaders, or with families could prove similarly informative about second-order problem solving and collaboration. In this way, the field could develop new understandings not only about how eBMPs might be used, but also the leadership and organizational practices contributing to their benefits or drawbacks.

Conclusion

School leaders are charged with many responsibilities relating to school discipline, climate, and family communication. Yet, only recently have schools begun to adopt technologies to support that work. As such, this study breaks new ground by describing how behavior management platforms may play a role in activities such as troubleshooting classroom behavior, improving instruction, and rethinking discipline policies. It also pushes schools to more deliberately utilize these tools for family engagement. Altogether, such efforts are unlikely to succeed or proceed meaningfully without the thoughtful investment of school leaders. We hope

that school leaders may take inspiration from our examples for how non-academic data might be used to dismantle inequitable disciplinary policies or to better support struggling teachers.

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Table 1

Characteristics of Study Sites

Variable	Stark Middle School	Compass Academy	Riverside Charter School
Sector	Public	Charter	Charter
Location	Medium-sized city	Large city	Small city
Grade level(s)	6-8	5-12	K-5
Demographics	300 students ~90% Hispanic >90% "high needs"[a]	700 students ~50% White ~33% African American/Black ~50% "high needs"[a]	300 students ~50% Hispanic ~33% White ~75% "high needs"[a]
eBMP	LiveSchool	LiveSchool	Kickboard

[a] "High needs" students include students with disabilities, English language learners (ELL), former ELL students, and low-income students

Table 2

Participant Characteristics

Characteristic	Stark Middle School	Compass Academy	Riverside Charter School
Total Participants	13	12	9
Gender			
Male	7	4	2
Female	6	8	7
Role			
School Leader	4	1	2
Teacher	9	11	7

Table 3

Cross-Case Summary of School Practices

	Stark Middle School	Compass Academy	Riverside Charter
First-order problem solving	Check-ins, especially among teachers	Check-ins, especially with students	Special occasions (e.g., errors in Special Education practices)
Second-order problem solving	Schoolwide expectations; supporting teachers; interventions for students	Overhaul of discipline policies for equity	N/A
Collaborating with families	Automated notifications; addressing problematic behavior	No caretaker eBMP access; ad hoc information sharing	Weekly printouts without follow up