Data Work in Education: Enacting and Negotiating Care and Control in Teachers' Use of Data-driven Classroom Surveillance Technology

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Today, teachers have been increasingly relying on data-driven technologies to track and monitor student behavior data for classroom management. Drawing insights from interviews with 20 K–8 teachers, in this paper we unpack how teachers enacted both care and control through their data work in collecting, interpreting, and using student behavior data. In this process, teachers found themselves subject to surveilling gazes from parents, school administrators, and students. As a result, teachers had to manipulate the student behavior data to navigate the balance between presenting a professional image to surveillants and enacting care/control that they deemed appropriate. In this paper we locate two nuanced forms of teachers' data work that have been under-studied in CSCW: (1) data work as recontextualizing meanings and (2) data work as resisting surveillance. We discuss teachers' struggle over (in)visibility and their negotiation of autonomy and subjectivity in these two forms of data work. We highlight the importance of foregrounding and making space for informal data workers' (in our case, teachers') resistance and negotiation of autonomy in light of datafication.

CCS Concepts: • **Human-centered computing** → **Empirical studies in collaborative and social computing**; *User studies*; • **Applied computing** → *Education*; • **Social and professional topics** → *Surveillance.*

Additional Key Words and Phrases: data work; datafication; surveillance; dataveillance; agency; resistance; invisible work; care; behavior management

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1 INTRODUCTION

With the rapid advancement of data-driven technologies, datafication has become a powerful way to translate social relations and phenomena into numbers and produce meaningful knowledge [85]. Datafication has been embraced to support a wide range of goals, ranging from the state tracking citizens' political engagement [48] to self-monitoring heart rates on personal wearable devices [10]. In this light, data-driven technologies have been widely implemented in the context of education to provide new insights into learning and teaching, school management, curriculum design, and more

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[20, 46, 88]. Students' lived experiences have been quantified into data to predict their academic outcomes and provide personalized learning support [18]. While datafication has shown its promise in improving accountability, transparency, and service orientation in schools, a growing amount of critical scholarship has stressed that datafication in fact abstracts the complexities, contexts, and meanings of social realities and overlooks human bias and values in producing data [15, 47, 49]. At the same time, the wide use of data-driven educational technologies has also been criticized for heightening surveillance and control in schools and classrooms [3, 47, 88, 89].

Indeed these data-driven technologies have not only transformed the landscape and capacity of education and pedagogy, but also generated new—and predominantly unarticulated—forms of work for teachers. Teachers have to undertake these new forms of data work in collecting, managing, and interpreting varied kinds of student data to inform pedagogical decisions and teaching practices [52]. Yet, rarely do people talk about resistance and tensions in light of the datafication of education and how the new labor of data work impacts teachers' practices and their collaborations with other educational actors such as school administrators, parents, and students.

This paper addresses these gaps by bringing teachers' data work to the fore. Our work was guided by two research questions: **RQ1:** What types of data work are performed by teachers and how do they enact them? **RQ2:** How is teachers' data work shaped by and shaping their relations with other educational actors? Answering these questions allows us to attend to the navigation and negotiation of power dynamics in teachers' mundane data work. Our paper, therefore, is not directed toward opportunities for designing technology interventions. Instead, we aim to shed light on how the nature of teachers' situated expertise and moral authority is shifting, and how datafication and data work complicate the discretion and autonomy that have long been sought by teachers.

We investigated these questions by drawing insights from an interview study with 20 K-8 teachers who were involved in using ClassDojo in classroom settings. ClassDojo is arguably one of the most popular data-driven behavior management technologies on the market [19]. It allows teachers to quantify, track, monitor, and analyze student behavior in the classroom and communicate student behavior data with parents and school administrators [89]. In other words, ClassDojo breaks the temporal and spatial enclosure, causing the boundaries among multiple surveillance sites—classroom, family, and the workplace—to blur [53]. Student behavior data thus emerge as the material object that connects this socio-technical assemblage and mediates multiple logics of monitoring and relations.

Our results suggest that teachers use ClassDojo for both controlling and caring for students in the classroom. While student behavior data made students increasingly visible in the classroom, they also rendered teachers' controlling and caring visible to other actors within the socio-technical assemblage, including parents, school administrators, and students. As such, teachers found themselves subject to the surveilling gazes from these actors, which led to a tension between presenting a professional image to these surveillants and enacting care and control that they deemed appropriate. Taken together, our paper contributes to computer-supported cooperative work (CSCW) by locating and unpacking two salient forms of data work: (1) In order to enact care, teachers undertake *data work as recontextualization* to reconstruct complex student bodies, needs, and experiences that are reduced into behavior data; and (2) Through *data work as resistance*, teachers manipulate data points to resist surveillance gazes and expectations on caring/controlling practices in the classroom (from parents, school administrators, and students). We discuss teachers' struggle over (in)visibility and their constant negotiation of autonomy in these two forms of data work. Our work reveals that data work consists of a potential to rethink resistance in light of datafication. We highlight the importance of recognizing and advocating for informal data workers' (in our case, teachers') resistance and negotiation of autonomy in future CSCW work.

2 RELATED WORK

We situate this paper in the scholarship of CSCW, science and technology studies (STS), education and pedagogy studies, and neighboring fields. We first review how the advancement of data-driven technologies has reshaped the landscape of education and the ongoing debates on the datafication and surveillance of student behavior. We then turn to recent scholarship on data work in different settings as we highlight the opportunity for investigating teachers' data work in light of datafication of education. Finally, we review teachers' practices in caring for and controlling students in the classroom, highlighting the opportunity for CSCW to investigate how teachers' caring and controlling practices are mediated by data-driven technologies.

2.1 Datafication of Education and Behavior Management

Datafication's promise lies in its ability to measure, capture, and represent complex social realities in quantified terms, which are then used to generate insights and knowledge of one's social life [15]. Education has become a natural site for datafication—schools and classrooms as the "data platforms" where "a wide range of data tracking, sensing, and analytics technologies are being mobilised" [88, p.134]. The use of data-driven technologies, as a result, has not only transformed the organization of teaching, learning, and school management activities, but also the construction of relationships among and realities of different stakeholders (such as students, teachers, parents, and school administrators) [40]. For example, data analytics tools have been studied for supporting school safety [3], producing evidence of learning [20], assessing and supporting student learning [25], and more. CSCW and human–computer interaction (HCI) have also examined the role of data-driven solutions in addressing varied needs in education (e.g., [22, 74]). A recent study described the challenges of integrating data work among the other responsibilities of educators, and the difficulty of producing data that are useful enough for decision making [55].

Increasingly, scholarship on datafication is raising concerns about various socio-technical implications. By quantifying complex social realities and relations, the multiple relationships between data and people are abstracted [85]. At the same time, if data are assumed as impartial and thus objective in reflecting the "truth," this essentially overlooks human bias and power structures in which data were collected, processed, analyzed, and communicated [26, 45, 66].

In education and pedagogy studies, scholars have also discussed the growing control and surveillance on student bodies that has resulted from the increasing availability of data [8, 50, 91]. In particular, one thread of this research looks into the consequences of the datafication of student behavior. Scholars argue that the quantification of student behavior just replicates classroom practices that reward obedience while punishing inappropriate behavior [90]. Manolev et al. presented a case study on ClassDojo and argued that systems like ClassDojo essentially reduce the multiplicity of student experiences into data points, and push teachers to classify, rank, and eventually evaluate students [53]. Lu et al. further unpacked how teachers' biases can shape their use of ClassDojo and student behavior data [47]. These authors argued that seeing classroom surveillance and student behavior data as objective risks further justifying and materializing the unequal conditions for disadvantaged students. And more important, ClassDojo's school-wide communication and teacher–parent collaboration features have been criticized for extending surveillance to the space of the entire school and home in real time [47, 53]. That is, the temporal and spatial boundaries among the classroom, home, and the rest of the school are blurring [40, 89].

Overall, most of the aforementioned studies focus on the potential consequences of ClassDojo and other such systems on students [7, 53, 89], with fewer insights into how these data-driven technologies impact teacher practices in the classroom and their relationships with students and other actors. To this end, our work extends the discussion in CSCW/HCI related to the increase of

datafication in education (e.g., [18, 22, 55, 74]) and contributes empirical insights on how teachers perceive and use ClassDojo. Importantly, we situate these practices in the power arrangements within the socio-technical assemblage of human actors (including students, teachers, parents, and school administrators), technology artifacts, and data objects.

2.2 Data Work and CSCW

Datafication results in a set of socialtechnical activities that emerge as data work. We define data work as "any human activity related to creating, collecting, managing, curating, analyzing, interpreting, and communicating data" [14, p.466] that consists of the necessary forms of technological, analytical, and emotional work that makes data meaningful [30]. Understanding data work is a CSCW problem considering CSCW scholars' interests in invisible work [76, 79], articulation work [71, 77, 78], as well as the work of managing boundary objects and coordination mechanisms [51, 75]. Bringing data work to the fore helps us attend to the oft-invisible work behind collecting, analyzing, and using data in providing services, informing decision-making interventions, and supporting collaboration among actors. And central to this invisible work are the situated discretionary practices carried out by individuals and groups in these activities [67]. In this light, CSCW scholarship that looks into data work mainly focuses on three threads of investigation: (1) how data work is carried out and impacts the collaboration among stakeholders in different contexts, (2) how data work transforms the nature of people's experiences within these contexts, and (3) how data work and data-driven practices are shaping and shaped by the power arrangements within the network.

In particular, past CSCW and HCI studies have examined the professional data work conducted by data scientists [61, 67], as well as the more informal form of data work in health care [13, 34, 44, 69], law enforcement [72], nonprofits and social enterprises [12, 81], civic participation [59], and more. An exemplar can be found in Shklovski and colleagues' case study on how location-monitoring systems worn by sex offenders shift the work of parole officers [72]. These authors argued that while the location data made parolees' location and movement more legible to parole officers from a distance, parole officers had to do additional and more on-the-ground "legwork" to communicate with parolees, make sense of the location, and judge whether the location data indicated suspicious activities. This legwork is a kind of data work that parole officers had to undertake in order to exert control over parolees. In fact, with the growing dependence on the data work in their job, location data tracking that parole officers originally used to monitor parolees became a technology of disciplining themselves—parole officers now have to meet the demands of data-driven technology to fulfill their duties [72]. Aligning with this argument, CSCW studies have shown datafication adds labor to professionals in articulating and reconciling the needs of different stakeholders [12, 13, 81], and it codifies and displaces their situated expertise and discretion in their professional work [43], which leads to the "erosion of autonomy" in their data work [12].

Within the educational context, scholars have drawn a parallel between teachers and data workers and asserted that "teachers collect a huge amount of data every day [including quantifiable data such as test scores and less quantifiable data such as student behavior] and must process these data to determine instructional actions" [52, p.2]. Yet, in an investigation of teachers' specific needs related to data use, Jimerson and Wayman identified the lack of systematic guidance on teachers' everyday data work [41]. In doing the data work, Williamson contended that human teachers have become partly "robotized," arguing that the seemingly objective measures and numbers calculated by technologies are dominating teachers' professional judgment, experience, and subjectivity [91]. Yet, empirical understandings of teachers' data work are still lacking in CSCW.

Together, our work extends the discourse on data work in CSCW to education. We investigated teachers' use of ClassDojo and their data work around collecting, manipulating, and using student

behavior data, through which we uncovered how student behavior data come into being via teachers' data work. We attend to foregrounding the negotiation and tensions in this process that are often masked under data objects. That is, we shift the focus from data objects back to teachers. In doing so, we aim to uncover teachers' agency in their data work, and in turn nuance the notion that teachers are becoming partly "robotized" [91].

2.3 Caring in the Classroom

Besides teaching and service, caring for children is central to teachers' identity [1], and it is a key motivation for becoming a teacher [87]. Caring for children involves teachers' emotional commitment and often consists of a wide range of practices and embodied feelings [31, 87]. From the feminist perspective, care attends to the mundane labor in sustaining and flourishing the network consisting of our bodies, our people, and our environment [23, 83]. Educator Nel Noddings called for an ethic of care in education that highlights caring as situational, reciprocal, and committed [62]. That said, caring for students relies on teachers' relations with students and their commitment to students' situated backgrounds, well-being, and interests [63].

Yet, feminist and education scholars have warned us of the gendered logic embedded in caring and teaching as a profession. In fact, teachers have historically been and continue to be a woman-dominated profession. In the U.S., about 80% of public school teachers are women [84]. The dominant discourse constructed caring and nurturing as natural feminine attributes [31]. In effect, teachers' work has been naturalized as "women's work" because it allows women to effortlessly "do 'natural', quasi-maternal 'caring' "[2, p.19]. This gendered role in caring and teachers' work illustrates the politics of caring and urges us to attend to the question of *who is doing the caring work?* [56].

Similar to the invisibility of data work noted earlier, teachers' caring work is often rendered invisible because of the gendered construction of care. Meanwhile, scholars have contended that the emphasis on teachers' performance and competence further renders teachers' caring invisible and less valuable [5]. Sandra Acker distinguished "work" and "non-work" for teachers [2]. She argued that teachers are involved in both visible "work" that constitutes payment for labor, and invisible "non-work" that consists of caring and nurturing [2]. In the U.S., the "work" part of teachers' work is evaluated by standards-based classroom observations, student standard testing outcomes, student performances, accountability measures, and more [27]. These professional expectations thus construct how a "good" and "professional" teacher should appear and lead to a culture of performativity in schools [24]. At the same time, the nuanced practices of caring in the classroom are being coded, measured, and evaluated [68]. As such, teachers' subjective moral authority in caring has been confronted by managerial discourse, and it has been displaced by performing the professional and accountable identity that can be surveilled and measured [31]. In effect, this tension can result in teachers' anxieties and self-doubt in their navigation of varied actors' shifting needs and expectations [5]. In fact, this tension can further complicate the tensions between controlling students' conduct and caring for their development in the classroom [58, 70]. In McLaughlin's works, the conflicts and intertwinement between control and care in the classroom are inevitable because of the "continual interplay between the intentions of individuals and institutional constraints" [80, p.34].

In CSCW and HCI, scholars have investigated the promise and politics of care and how care is mediated through technologies in different contexts, including health care [9, 43, 44], maker spaces [65, 82], civic participation [59], logistics [39], and education [42]. Kaziunas et al.'s ethnographic study illustrated how a data-driven blood-glucose monitoring technology shifts the relationship between parent-caregivers and children, which highlights the multiple relations among data, people, and caring practices [43]. Through advocating for *caring-through-data*, these authors urged us

Key Affordances	Description
Classifying and quantifying student behaviors	• ClassDojo classifies student behaviors into undesired "needs work" behaviors (e.g., "off task," Fig.1a&1c) and desired "positive" behaviors (e.g., "on task," "participating," see Fig.1b) • Teachers can change the Dojo point weight of each behavior parameter (from 0 to +/-5 Dojo points, see Fig.1c) • Teachers can customize behavior parameters and corresponding Dojo point weight to the needs and expectations of the class
Monitoring, tracking, and documenting student behaviors	• Teachers can set up a profile for each student. They can award or take Dojo points away from students by documenting students' behaviors on their phone, tablet, or computer (see Fig.1d) • Teachers can check individual students' and the whole class's consolidated behavior report (see Fig.1e)
Providing audio-visual feedback on student behaviors	• ClassDojo provides audio feedback on student behaviors: when teachers documented desired student behavior, the system would play a gratifying "ding" sound effect, whereas an unpleasant "dang" sound effect would be played when any undesired behavior was documented • ClassDojo also provides visual feedback on student behaviors: desired behaviors are labeled in green and undesired behaviors are labeled in red. Students are similarly labeled in green or red according to their Dojo points (see Fig.1d)
Connecting with parents and school administrators	• Teachers can connect with parents by sending whole-class and direct messages • Parents can receive real-time notification on their devices when their children gets/loses Dojo points in the classroom • School administrators can also connect with teachers and parents on ClassDojo

Table 1. Summary of ClassDojo's major affordances

to shift the analytical focus from how data and technologies are providing care, to the mundane practices of enacting situated care through data [43].

Our paper extends this line of research by contributing insights into how teachers enact care through a data-driven monitoring technology. Unlike past CSCW and HCI literature that often focused on teachers' needs and challenges in delivering curriculum, teaching, and communicating with other stakeholders, we attend to the caring aspect that is central to teachers' identity and everyday practice. In this way, we show how caring and controlling co-exist in teachers' use of ClassDojo and are in flux under the surveilling gazes from parents, school administrators, and students. Importantly, we bring teachers' data work in enacting caring to the fore; doing so allows us to deepen CSCW's understanding of caring-through-data and highlight that the behavior data are not enough to provide care themselves.

3 BACKGROUND: CLASSDOJO AS A DATA-CENTRIC SYSTEM

We first provide an overview of ClassDojo to contextualize our work, attending to the socio-technical aspects and the major affordances of the system.[1] ClassDojo is one of the most widely used data-driven educational technologies in K-8 schools to support teachers' classroom management and home–school communication. According to ClassDojo's official website, the system has been

[1]We describe the system as of March, 2020, the time when we conducted our study. Updates since are not discussed.

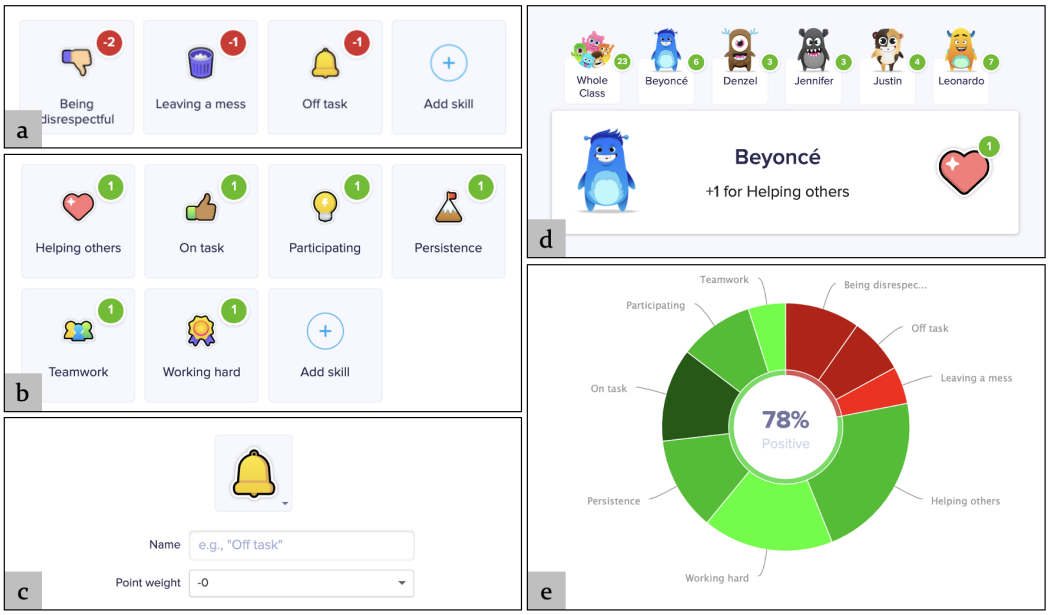

Fig. 1. ClassDojo screenshots: 1) sample "needs work" behavior parameters, b) sample "positive" behavior parameters, c) creating and editing behavior parameters and updating Dojo point weight, d) awarding Dojo points to students on the class dashboard, and e) consolidated behavior report for individual student and/or the whole class. ©ClassDojo

employed in more than 95% of K-8 schools in the U.S., and the platform has more than 51 million users across 180 countries [57].[2]

ClassDojo is free and straightforward to use. Teachers can install the system on varied devices, including smartphones, tablets, computers, and interactive whiteboards in classrooms. ClassDojo's key feature is its point system. Through this point system, teachers can categorize desired (i.e., "positive") and undesired (i.e., "needs work") behaviors in the classroom setting (see 1 for detailed description). Based on classroom expectations and perceived importance, teachers can assign a specific number of "Dojo points" to each behavior parameter (see Fig.1c). This point system enables teachers to monitor, track, and document the detailed behavior of the entire class and individual students based on their observation. To document student behaviors, teachers simply need to click the student's avatar, and then award Dojo points for specific pre-defined desired behavior parameters and take points away for undesired behavior parameters (see Fig.1d). This process is accompanied with immediate audio-visual feedback that is delivered to the whole classroom through a dashboard, which is often projected at the front of the room. In particular, desired behaviors are color-coded in green (see Fig.1b) and accompanied with a gratifying "ding" sound, while undesired behaviors are coded in red (see Fig.1a) and accompanied with an unpleasant "dang" sound. Teachers can check behavior reports for the whole class and individual students during a particular period of time. The behavior report shows the total number of Dojo points given, the detailed information of each Dojo point, and the overall trend of Dojo points (see Fig.1e).

In addition to teachers and students, ClassDojo involves multiple educational actors, including parents and school administrators. Parents can install ClassDojo on their phones to check their children's performance in the classroom. Parents can communicate with teachers through direct

[2]see https://www.classdojo.com/

messaging, and receive real-time notifications whenever their child earns/loses Dojo points in the classroom [29]. Furthermore, ClassDojo supports more than 30 languages. Non-English-speaking parents can translate teachers' messages, posts, and class stories to their preferred language on the platform. School administrators can also use ClassDojo to connect with teachers and parents [28].

ClassDojo connects multiple actors in different spaces together. Investigating teachers' data work in using ClassDojo in the classroom gave us a unique opportunity to critically uncover how teachers' data work is conditioned by and impacts the power arrangements within this socio-technical assemblage.

4 METHOD

4.1 Participants

This paper builds on data generated from in-depth interviews with 20 K–8 teachers. In order to be eligible for our study, participants had to (1) have experiences as teachers working with K–8 students and (2) have experience using data-driven behavior management technologies. All participants were actively using ClassDojo in the classroom setting. Participants were recruited through online recruitment and snowball sampling. In particular, recruitment information was posted on Reddit and Facebook subgroups for teachers. Participants were also asked to introduce potential candidates for the study. Our study was reviewed and approved by the university's institutional review board (IRB).

All participants but one were current teachers, and one participant was a former teacher who was now working as a technology consultant in a middle school supporting teachers' technology use. Among 19 current teachers, 13 were working in elementary schools (grades K–5) and six were working in middle schools (grades 6–8). The majority of our participants were working in public schools (n=17), and the rest were working in private schools (n=3). Most of our participants were women (n=17), and three were men, which corresponds to the aforementioned statistics that most teachers are women. Of all the participants, eleven were white, five were Latinx, two were Black, and two were Asian. In addition, even though we did not sample teachers from specific backgrounds in our recruitment, the majority of participants reported working in urban school districts with relatively high poverty rates (n=15), and about half the teachers reported working in schools with a large proportion of students from immigrant families (n=9). Detailed participant information is provided in Table 2.

4.2 Data Generation

Our data were generated from March to May, 2020. Because of the COVID-19 lockdown, field observation was no longer possible, and the study was conducted fully online. The in-depth semi-structured interviews were conducted with teachers by the first author through Zoom, Bluejeans, and Google Meet video calls. We asked participants' permission to record the interviews at the beginning of the study, and all the interviews were recorded and transcribed. At the end of the study, all participants received a $20 gift card as a compensation for their time.

Interviews lasted between 47 and 134 minutes (mean=75 minutes). Interviews included questions about teachers' motivations for using behavior management technologies, how they tracked students' behavior data through the system, what they liked and disliked about the point system and the rewarding mechanism, how their expectations and judgments of students impacted and had been impacted by their use of the system, and how the use of these technologies aligned and conflicted with their other roles and responsibilities as a teacher and an employee at a school. Teachers were also primed to think about how they utilize the behavioral analytics and reports generated by these technologies, and how their use of these tools impacts their practices in the

Name	Gender	Teaching Experience*	School	Grades	Subjects Teaching	Mandated Use
Sarah	Woman	Novice	Public	5	General, ELI	No
Denise	Woman	Veteran	Public	K-2	General, Math	Yes
Tony	Man	Experienced	Private	5	Literacy, Social Studies, ELI	Yes
Michele	Woman	Novice	Public	1	General, ELI	No
Aubry	Woman	Experienced	Public	7-8	Science	No
Kim	Woman	Experienced	Public	1-5	Music, PE, Art	No
Wendy	Woman	Experienced	Public	1-2	General	Yes
Natalie	Woman	Experienced	Public	7-8	Chemistry	No
Ciera	Woman	Veteran	Public	2	General	Yes
Sandra	Woman	Veteran	Public	2	General	Yes
Chrissy	Woman	Experienced	Public	6-8	Special Education, General	No
Wendell	Man	Experienced	Public	3-6	General	Yes
Kelly	Woman	Novice	Private	K-2	General	No
Sophie	Woman	Novice	Public	3	General, ELI	No
Tasha	Woman	Experienced	Public	7-8	History	No
Jeremy	Man	Experienced	Public	6-8	Tech Consultant	N/A
Tina	Woman	Experienced	Public	1	General	Yes
Angelina	Woman	Novice	Public	6-8	Spanish	Yes
Amber	Woman	Experienced	Public	6	General	Yes
Lin	Woman	Novice	Private	1	General	No

Table 2. Participant demographics, experiences, and mandated use of behavior management technology
*Teaching Experience: Novice (less than 5 years of teaching experience), Experienced (5-20 years of teaching experience), Veteran (more than 20 years of teaching experience) [21, 73].

classroom. The first author kept running notes during the process of data collection. This allowed us to identify early patterns, update interview protocols, and facilitate communication among research team members [11].

4.3 Data Analysis

We followed Braun and Clarke's six-phase reflexive thematic analysis to analyze the interview transcripts and memos [16, 17], and we analyzed the data in an inductive way. This method allowed us to identify patterns of meanings in the data. The inductive analysis allowed us to develop themes from the content of the interview data without fitting the themes into an existing theoretical framework.

In particular, the first three authors familiarized themselves with the data by discussing the interview transcripts and memos. The first author then conducted open coding on Atlas.TI and converted the text into codes. During this process, the first author met with the second and third authors weekly to discuss all the generated codes. During the weekly meetings, these authors reviewed the generated codes, reconciled disagreement among the team, and discussed the identified initial themes. This process was iterated until these authors reached consensus on the generated themes. The salient initial themes included surveillance as control, surveillance as care, surveillance on teachers, teachers' limited autonomy, and education network. Thereafter, the first author reviewed the candidate themes against the dataset and refined the themes. After refining the themes, all the authors defined each theme with an informative name and developed the narrative of each theme. Finally, the first author conducted member checking with participants to share and

validate our findings through online video calls and phone calls in August and September, 2020. In total, eight participants responded when we reached out for member checking.

5 FINDINGS

During the interviews, teachers stressed that behavior management is essential to their work in the classroom. They considered behavior management as the foundation to their teaching, service, and caring work. At the same time, they considered behavior management important in maintaining a safe and positive learning environment where students are able to focus on their academic and socio-emotional learning. Yet, behavior management was challenging to teachers, and teachers had to adjust their strategies and practices based on particular student groups that they were working with. In this light, ClassDojo has become the go-to techno-solution for teachers. According to participants, ClassDojo offered an all-in-one data-driven solution to help them monitor and track student behavior, provide students with immediate feedback on their behavior, generate insights on individual students by looking at their behavior patterns, and communicate the student behavior with parents, school administrators, and other stakeholders. While the majority of participants first adopted ClassDojo because of its popularity and the aforementioned promises, eight participants' use of the system was mandated by their school districts.

Overall, we found that teachers enacted both control and care in their use of ClassDojo. While the data-driven solution simplifies teachers' work in controlling and disciplining student behavior, teachers had to undertake new labor of data work to enact care in practice. At the same time, teachers' use of ClassDojo was conditioned by the surveilling gazes and pressures from the network of actors, including parents, school administrators, and students. Yet, teachers' data work allowed them to negotiate their agency and autonomy in control and care with these actors.

5.1 Enacting Control through Data Work

Echoing Foucauldian rhetoric of drawing parallels between the education system and other disciplinary sites like the military and prison, some teachers considered behavior management as having the class and its students under control and holding them to a strict discipline. Jeremy considered teachers to be similar to the Orwellian "*Big Brother*," watching students to make sure rules were being followed and order was sustained:

> *I don't really like to make school sound as a militaristic type of environment, but at the end of day, [...] it's about maintaining order and decorum.*

Indeed, throughout the interviews teachers kept highlighting the importance of controlling and maintaining the order of conduct for the sake of student safety and learning. The use of ClassDojo allowed teachers to enact control through (1) codifying behaviors, (2) disciplining through data-mediated reward and punishment, and (3) implementing continuous psychological monitoring.

5.1.1 Codifying Behaviors. As noted, the ClassDojo point system allowed teachers to quantify and codify desired and undesired behaviors into detailed behavior parameters, based on ClassDojo's default "positive behaviors" and "needs work behaviors" as well as teachers' specific expectations. This quantification system thus served as a yardstick for teachers to monitor and measure whether students had met their expectations. As described by a middle school teacher, Aubry, these measures became a matrix of "*black and white*" to control students' conduct with no "*if, ands or buts*," which left little wiggle room.

In fact, several teachers highlighted that codifying behavior was especially important for middle school students. According to the sixth-grade teacher Amber, "*in middle school, there is more temptation to not do the right thing*." Having a way to quickly document and provide feedback to student behavior can help the teacher feel that they are able to maintain their classroom culture

and focus. Natalie, a chemistry teacher at an urban public middle school, talked about how she had been using ClassDojo to quickly document student behavior on her device without stopping to interrupt the flow of teaching:

> *I can say, "You were disrespectful. You got up out of your seat, you didn't raise your hand." Or, "You raised your hand, you were ready to go. You were prepared. You were on task." Very specific behaviors that I can give or take away points that [ClassDojo] keeps track of.*

Natalie's use of the term "specific" was telling—teachers' setup of the behavior parameters was often detailed and specific enough to cover "all" student behaviors in the classroom. Under this system, teachers' discretion in behavior management could be partially outsourced to these preset and codified parameters, and the resulting data were abstracted from the nuances of student behavior.

5.1.2 Disciplining through Reward and Punishment. Through codified behavior parameters and constant behavior tracking, complying with preset desirable qualities would be rewarded, while disobedience could be penalized. Teachers enacted control over student behavior through implementing the reward and punishment mechanism mediated through behavior data and ClassDojo. Throughout the interviews, teachers used words like "simple," "easy," and "quick" to describe rewarding and taking away Dojo points to control students' undesired behaviors while maintaining the flow of teaching. Michele was a first-grade teacher, and her quote exemplifies such rhetoric:

> *For me, personally, I feel like sometimes kids need to see [the deduction of Dojo points], they need to be reprimanded if they're not behaving. And I feel like that's an age-appropriate thing to do for them, especially in the classroom, and it's quick and easy and they can see that [because] it's visual. [...] You need to show the students that, "Hey, you're not acting right and I need to take this from you."*

Here, enacting control in the classroom became "quick and easy" for teachers because of the immediate feedback afforded by monitoring behavior data with ClassDojo, together with the potential elimination of teacher discretion and preset behavior parameters, as noted. Instead of interrupting teaching activities to manage behavior, teachers utilized the behavior data as a "reprimand" to highlight to students their non-compliance.

In some cases, restricting students from getting rewards also enacted teachers' control over students. ClassDojo's point system could therefore be a mechanism for managing rewards and access to privileges, as well as communicating them to students. For example, students with a certain number of negative Dojo points or not enough positive points might not receive the same incentives as their peers (e.g., participating in the class party or hanging out with peers during the Friday recess).

5.1.3 Implementing Psychological Surveillance. Finally, teachers were trying to implement psychological surveillance on children through their use of ClassDojo. According to teachers, students were aware of "being watched" and thus primed for self-discipline. For instance, the use of the classroom management technology was mandated at Tony's school in the Southeastern U.S. In his fifth-grade class, Tony sometimes chose to put the class dashboard on the projector, which intended to allow students to monitor one another and call their misbehavior out. Students' sense of "being watched" afforded Tony's constant control and disciplinary power in the classroom as if he was continually and actively monitoring. He explained:

> *It's a huge accountability on [students], so they know that they're always being watched. [...] So usually after a while, the kids get into a routine that knows I'm always checking. Even when I'm not checking, they think I'm checking.*

It is worth noting the use of the term "after a while" here. Indeed, enacting the continual psychological surveillance required time for students to internalize the codified behaviors and consequences of being (not) docile.

Teachers also relied on the distinct audio feedback associated with the positive and negative Dojo points to facilitate the psychological surveillance. A common strategy adopted by teachers was setting up a negative behavior parameter with zero points deducted or creating a dummy student account. When noticing some undesired behavior in the classroom, teachers could click on the dummy negative behavior parameter button and play the negative "dang" sound effect. Teachers considered this audio feedback an effective way to remind students of the very existence of the punishment system and the potential consequences of misbehaving without actually penalizing them. Natalie noted:

> *If I'm teaching, I walk around on my phone and my ClassDojo on, and if the kids [are] talking, I'll just take a point away and they won't know who it is. They'll just shut up immediately because they don't know who I took it away from.*

Taken together, controlling through monitoring configured two modes of power relations in the classroom. On the one hand, it enacted teachers' disciplining power over students. That said, teachers were able to observe, track, and control those students who violated or did not meet the pre-set rules through the behavior data. On the other hand, students exercised disciplining power on and among themselves. Knowing that they were under scrutiny led to students' self-control and compliance to the expectations.

5.2 Enacting Care through Data Work

On the flip side, teachers relied on ClassDojo and student behavior data to enact caring practices in the classroom. In particular, we unpack three major ways in which teachers tailored their data work to students' needs and growth: (1) motivating students through positive reinforcement, (2) fostering a positive learning community in the classroom, and (3) acting upon the behavior data.

5.2.1 Motivating Students through Positive Reinforcement. Many of our participants mentioned the promise of recognizing, tracking, and rewarding students' desired behaviors in the classroom through student behavior data and Dojo points. Teachers intended to motivate students to strive for more positives. Wendell, a teacher of grades 3–6 in a Midwestern public school, endorsed the affordance of tracking students' positive conduct on ClassDojo and described how rewarding one student's positive behavior could motivate other students to do the same:

> *If I see someone doing something kind, and I say, "Hey [...], that was such a beautiful thing you did." And I'd give her a point, and she hears the sound and she kind of lights up. And then other kids kind of follow in place too. They want that sound. Their faces light up too, and they in turn help someone pick up a pencil or help someone do something. [...] It's also their social and emotional [learning] that you can use this app for.*

Teachers acknowledged that not all students had the same intrinsic motivation to stay engaged in the classroom. To "*push students to do better*," some teachers enabled students to redeem their Dojo points for tangible prizes and incentives—for example, stuffed animals, homework tokens, and class parties. In the meantime, caring required teachers to put special attention and affection on students with constant behavioral needs. In Angelina's words, teachers tried to document and reward these students' every single effort "*even if it's a little thing*."

Angelina was a novice Spanish teacher at a rural public middle school. At the time of the interview, she only had one year of teaching experience and admitted that she was still exploring ways to enact care through the mandated use of the behavior management system. To encourage

and motivate students who needed the most support and guidance, Angelina tried to document these students' minute positive actions like not swinging their backpack or hitting other people when coming into the classroom. She said,

> *I feel like the positive points maybe make me feel better, because as a person I really want to make the kids feel appreciated and cared for, but I don't really think it does it for them. But I'm like, "Yay, good job. You did a good thing." So I feel like I'm rewarding them.*

As this quote suggests, teachers attended to the nuanced behavior of students in their data work to enact care in a reciprocal way. Angelina was trying to enact care by monitoring student behaviors and giving positive Dojo points in the hope of making students feel cared for. Even though Angelina might not get an immediate response from the student she cared for, caring to her was fulfilling a responsibility as a teacher.

5.2.2 Fostering a Positive Learning Community. Teachers also enacted caring by using ClassDojo to foster an open learning community in the classroom. By emphasizing community, each member of the community, including teachers and students, shared accountability and ownership in classroom management and caring for one another. Sarah was a novice fifth-grade bilingual program teacher at a public elementary school in the Midwest. She told us:

> *I describe myself as a teacher, as a part of the community and not the boss, per se. And I do explain to them, as the adult in the room, I have a perspective that is a little bit stronger than theirs, but that doesn't mean that only my thinking goes and only my expectations go. [...] So it's an interesting dynamic to put myself on a pedestal as the adult in the room, but then [...] I'm a part of the community as much as they are.*

Sarah's quote highlights how teachers saw students' role in caring. Here, she indicated her progressive pedagogical style in which she used the tool to collaboratively develop a common ground with students on what the classroom accepted norms were. This classroom relationship allowed students to have a voice in deciding on what expectations and goals the community should value and follow collectively. Yet, Sarah placed herself on a "pedestal" to command the room and guide its direction.

A similar case of building a positive learning community through ClassDojo could be found in a quote by Tasha. Tasha was a history teacher of grades 7–8 in a Southern public middle school. Tasha was vocal that the use of classroom management technologies should be centered on "*establishing an environment of expectations*" as a collective instead of "*correcting negative behavior*," which indicated her belief in progressive education. For Tasha, enacting care involved the work of inviting students to establish rules of behavior data collection:

> *I already have in my mind expectations that we're going to establish on ClassDojo, but I don't just lay them out there like the law of the land. I garner [students'] feedback, their input, so that they feel like they have some ownership over what we're going to establish as the classroom's culture. It's not even so much about rules. It's like, this is our home.*

Similar to Sarah, Tasha provided ongoing negotiation and communication with students to enact care, while maintaining overall control over and direction of the environment. This communication was essential to determine the expectations and norms of how the classroom should operate and how parameters on ClassDojo should look, and to ensure these norms and parameters were meaningful to students. Yet, we observed that it could be more challenging for teachers with younger students to engage in this form of communication. For example, Kelly was a novice K–2 teacher at a private school, and she discussed this difficulty:

> *Ideally, we need to give that power to the students, but I think that can be difficult when the students are still young and they are [...] still testing their limits and boundaries. It's*

> *really hard to do with the younger kids. [...] And a lot of the times it doesn't work, they always come back to me like and look at me like, "help," you know, "I need help."*

In Kelly's case, sharing accountability with her young students in the aforementioned way might lead to additional labor for her.

5.2.3 Acting on the Behavior Data. Teachers described how the behavior data alone would not represent the behaviors of students in context. To act on the data and enact care, teachers needed to use it as part of a more holistic process in understanding their students and knowing how to address their behaviors. They discussed the importance of recontextualizing the abstract behavior data with their students to provide individualized care. Per Kim, a teacher of grades 1–5 in a Southern public elementary school:

> *For me, [...] by looking at the data, you want to figure out a strategy for students who need improvement. That's the main goal for teachers. It's not about you wanting to put a certain [score] for certain students, good or bad. That just defeats the purpose.*

To do so, teachers had to understand the potential factors that led to students' particular behavior in the classroom. This required teachers to build rapport with students, especially with those who needed more support. For example, Michele was teaching in a first-grade classroom as a dual-language teacher. She told us that she made it clear to students that her intention of monitoring and tracking behaviors on ClassDojo was to help them to make sense of behavior issues together:

> *That [helped] me connect with [them] in the way that I can take that time to like talk about, like "Hey, this is why I took a point away, do you understand why, and kind of why did you act this way that I had to take a point away or notice something bothering you?" I guess that would give me a good, you know, pathway to making that connection.*

For Michele, data work involved re-contextualizing and using the abstract behavior data in practice. This data work allowed teachers to trace the context in which the behavior data were produced, re-construct the deeper meanings flattened into the data point, and thereby judge what support and care was needed.

Another third-grade teacher, Sophie, adopted a similar practice to make sense of the behavior data with students. Sophie was a novice teacher in an English language instruction (ELI) classroom in a Midwestern elementary school. At the end of each week, Sophie sat down one-on-one with students to go through each Dojo point they earned and lost, in order to collectively come up with two tangible goals for the next week. During these conversations, Sophie had to consider the potential factors that led to student behaviors, which were absent from the behavior data:

> *I understand that some of my students have trauma and have additional things that they're bringing into the classroom that could affect how their week has been, and that was their opportunity to say, "Yeah, I had 54% this week because..." I had students say, like, "I got this because I didn't get a lot of sleep this week, so I was tired and grumpy," or "I felt hungry a lot", [...] "Oh, I was in a fight with my friend so I was trying to process it." [...] When we were chatting, that's what I would get out of it.*

Both Michele's and Sophie's quotes show how the behavior data required integration into practice and relationships with their students in order to enact care. Teachers enacted care through their data work in making sense of the student behavior and understanding individual students' unique situations where data were generated and collected.

Overall, caring in the classroom was attentive to students' situated needs, backgrounds, and interests [63]. Yet, these needs, backgrounds, and interests were abstracted in the process of datafication, and teachers' data work in reconstructing these situated contexts were required in enacting care.

5.3 Negotiating Care and Control under Surveillance

ClassDojo extended behavior management beyond the physical space of classrooms [53], because its use was not self-contained but the outcome of the entanglement of social actors and material objects situated within a wider socio-technical assemblage. Our analysis revealed that teachers' practices were being conditioned by this matrix of power relations, and so were their intentions of caring and controlling.

In this section, we delineate three major groups of actors in this socio-technical assemblage from the teachers' perspective: (1) parents and families, (2) schools and districts, and (3) students. Importantly, we underscore how the availability of student behavior data impacted teachers' visibility to these actors, and how teachers took on data work to negotiate their autonomy under these surveilling gazes.

5.3.1 Pressure from Parents and Families. All participants highlighted the importance of family–school collaboration in behavior management. As one of the platform's major selling points, ClassDojo enabled teachers to communicate student behavior data with students' parents via the messaging feature. Parents could join ClassDojo and receive real-time notifications whenever the teacher was giving or taking points away from their children. At the time of the interview, Jeremy served as the technology consultant at a middle school in Georgia. In Jeremy's words, ClassDojo extended classroom surveillance beyond the school's walls and into the family home by "*filling that sociological void between home and school and establishing some sort of connection there where parents can be involved in their child's education indirectly over cloud, and still have a say and still know what's going on without actually being in the classroom.*"

In theory, having parents in the classroom surveillance network would allow teachers and parents to have similar expectations and develop synergy to better support the children's social-emotional and behavioral learning. In practice, however, families and teachers were often not on the same page in terms of behavior management [54]. In our case, such tensions mainly stemmed from (1) the perceived lack of trust from parents and (2) conflicts in expectations and ideologies, which in turn shaped the ways in which teachers used the system.

Teachers believed that successful teacher–parent communication through ClassDojo relied on mutual trust between parents and teachers. However, teachers expressed a lack of perceived trust from parents. Denise, a K–2 math teacher at a Midwestern public elementary school, described her dilemma: "*Some parents think that maybe you don't like their kid, you have a bad relationship with their student. And a lot of parents, they are young, they're in denial [of their children's behavior].*"

As a result of this perceived lack of trust, some teachers used the point system to keep detailed records of student behavior to justify their own practice in the classroom. Some participants admitted using ClassDojo more intensely to monitor students' every minute behavior. Kim, for instance, described the behavior data as "*evidence*" to cover teachers' backs. Another first-grade teacher, Lin, echoed that such evidence was necessary for protecting teachers from difficult parents and their ire:

> *For those kids who have very challenging behavior, who have very challenging parents, [...] I can pull out the data. [...] If you say something to the parents and parents kind of want to complain about this or have concerns about this, they're going to report you to other admins. If you don't have records, it can count against you.*

The sentiment of keeping detailed behavior data as evidence indicates a new kind of data-mediated negotiation between teachers and parents. Here, the behavior data became the representation of both students' and teachers' performance. In response to parental gaze, teachers undertook the

additional work of manipulating the data representation to justify that they were being professional in their job.

In addition, teachers perceived misalignment of goals and ideologies between parents and themselves, which further conditioned teachers' use of the system. Recall that Angelina was a middle school Spanish teacher in a conservative rural district. She explained to us how this identity led parents to push back on her behavior management work because of the local stigma associated with speaking Spanish.

> *This area is really rural, a lot of the parents are working two or three jobs, they're stressed out, they have a lot going on. [...] And because it's conservative, a lot of the parents really don't want their kids to learn Spanish, because they associate Spanish with people coming into the country. And so a lot of times if I communicate with the parents [through the messaging feature], they'll be really antagonistic.*

Moreover, such parental power could turn into disciplinary power over teachers through the surveillance mediated by the behavior data. Some participants felt they were under parents' scrutiny and interrogation on each behavior data point they collected. Some of the data, however, might be part of teachers' intentions of implementing psychological surveillance over students or motivating students through recognizing minor positive behaviors, as described. In this case, because the behavior data did not include nuanced contexts, they led to additional work in noting the specifics of each data point to avoid further tensions between families and teachers. According to Sophie, this situation was especially prevalent among "*helicopter parents*" who paid close attention to their children and "*parents who felt like their kids were perfect and did no wrong*." She admitted that she decided to not have parents on ClassDojo this year because of pressure from being watched:

> *There were a handful of parents who would check it constantly and I'd get messages in the middle of the day, like, "What happened at 9:33 this morning that so-and-so got a warning? What were they doing that was disrespectful?" [...] Having parents checking [ClassDojo] all day long and wanting to know what's going on is crazy.*

Sophie's statement indicates the new kinds of *visibility* of teachers. The behavior data rendered Sophie's previously invisible work in the classroom visible beyond the classroom in real time. Such visibility afforded parents the ability to "have a say" and exert power in the classroom and over teachers, and teachers had to navigate their practices of caring and controlling under the parental gaze.

And in some cases, teachers intentionally did not report accurate data on ClassDojo to maintain the relationship with parents. Jeremy described his observations:

> *We've had really active PTAs (parent–teacher associations) and PTOs (parent–teacher organizations) where parents have been buddy-buddy with teachers. [...] They hang out outside of school, etc. That creates some sort of efficacy issue where there isn't as forthcoming of reporting [on ClassDojo] because the teachers don't want to tarnish the relationship they have with those parents and report what's really going on.*

Both Sophie's and Jeremy's cases illustrate teachers' resistance to parental gaze: Sophie tried to reduce her visibility by limiting parents' access to the behavior data, and Jeremy's coworkers obscured the visibility by manipulating the data entry. Taken together, the behavior data that teachers used to discipline students in turn led to the discipline of themselves. Therefore, such data were the product of the negotiation between teachers' intentions of caring/controlling and their response to the disciplinary power from parents and families.

5.3.2 Constraints from Schools and Districts. This situation was further complicated with the introduction of schools and districts as an actor. As noted, to facilitate communication within

the school, eight schools and districts mandated the use of behavior management technologies. In this case, student behavior data and teachers' use of ClassDojo became visible to the school administrators. As school employees, some participants raised their concerns with being watched by school administrators. Ciera, for example, said that this workplace surveillance made her especially careful about how her use of the point system and messages on ClassDojo could be interpreted.

In some schools, behavior management was associated with teachers' job status. Some participants revealed that certain teachers in their schools had to leave their job because of poor behavior management outcomes. For instance, Jeremy acknowledged witnessing the school principal interrogating teachers' behavior management practices by pulling student behavior data from ClassDojo. Such reprimanding could impact teachers' professional evaluation. As such, teachers had to navigate between the pressure of meeting professional expectations while enacting care and control that they deemed appropriate.

In addition, teachers' use of behavior management technologies could be indirectly impacted by the organizational structure of schools and districts. For example, some schools implemented the Positive Behavioral Interventions and Supports (PBIS) framework to guide schoolwide behavior management[3]. Under this three-tiered framework, students with more behavior issues would be classified into tiers 2 and 3 to receive more intensive and professional support from schools and districts, compared to those in tier 1. According to Michele, some teachers intentionally tried to escalate some students to higher tiers for the purpose of seeking more professional resources and services for their classroom. To do so, the school required teachers to have detailed documentation of student behavior and teachers' effort in supporting these students. Similar to the intention of providing "evidence" to parents, as we noted, some teachers had to heighten monitoring and data tracking on these students to "*give all the evidence that they can to push [students] up the tiers*."

Tasha's use of ClassDojo was not mandated by the school. However, Tasha said student behavior data on ClassDojo could serve as evidence to showcase teachers' past work with students when attempting to get support from the school. She explained:

> *That data comes in handy, and then when it comes to staff and administrators, there's an expectation that we have done certain due diligence on our end as a teacher before we try to pass off an issue to them as administration. So if I have a kid who's constantly tardy or constantly on their device, then they're going to want to see the data where I have implemented some behavioral management.*

In this case, we see how caring and controlling were conflated by teacher discretion and the administrative surveillance from the school. In order to enact caring for students and strive for more resources, teachers had to negotiate with schools through manipulating the behavior data. Again, the behavior data here signified both student and teacher performances. Yet, the heightened data work on these students might enact heightened control and punishment, and teachers' data work became increasingly critical in making their work legible to the school administration.

5.3.3 Pushback from Students. Finally, the very existence of a monitoring mechanism in the classroom could stir up the tension between teachers and students. Tony, for example, described that he had been "*cursed out,*" "*called stupid,*" and "*yelled at by a kid at the top of their lungs*" because of his strict use of behavior management technologies for the purpose of control. Such tension could further stimulate student negative behavior in the classroom and resistance to teachers' data work. Amber, a sixth-grade teacher at a public middle school, also told us that she felt "*verbally and*

[3]PBIS is a three-tiered framework that integrates data, systems, and practices to improve student behavior and performance. It provides multi-leveled support, resources, and interventions based on the needs of students. See https://www.pbis.org/

physically threatened" by her students when she was trying to warn students through behavior data:

> *There was one girl just kept talking throughout class, and it was a test, and she wouldn't stop talking. And I had tried to quiet her, and I said, "Okay, I'm so sorry, but this is going to be a negative point." And she got really mad, and she was like, "Well, I don't care. You can give me the stupid point." And she just kind of blew up.*

Amber described herself as relatively short and of small stature when compared to middle school students. She speculated that her physical size played into the power imbalance that contributed to students pushing back. Meanwhile, teachers admitted that experiencing such tension in the classroom fueled their own frustration, struggle, and anger at times. These emotions could displace teachers' intentions of caring and controlling. Ciera, for instance, was a veteran second-grade teacher at a public school in the Midwest. She described:

> *Sometimes you fall into that trap. That's what I call it, because you just get to the point where you're at your wits' end, and you don't know what else to do, and the whole class ends up getting punished, even though everyone didn't do something.*

In some cases, teachers' use of the system was counter-monitored by students. Such surveillance power from students also pushed teachers to use the system in a consistent way. Aubry, a middle school science teacher described:

> *They'll call you out. The kids will be like, "Oh, you didn't give so-and-so a point." Or, "He got up at the seat, you didn't take a point." Okay. I'm sorry, I'm sorry, I'm human. Sometimes I mess up. Yeah, so you just have to be very, very consistent.*

Such consistency was the key to effectively enacting caring and controlling. Aubry's quote suggests that the ClassDojo behavior data also changed the visibility of teacher practices within the classroom. Teachers' caring for and controlling over each student were made legible and transparent to students. This new visibility in the classroom similarly led to the discipline of teachers themselves and extra labor of data work in maintaining the consistency in using behavior management technologies.

6 DISCUSSION

The promise of data-driven solutions lies in their ability to simplify complex social realities and relations into data points [15]. Through datafication, complex human bodies and social relations are translated and reduced into categories and numbers, which are used to inform evidence-based decisions and support collaboration among different actors [45, 49]. In the case of ClassDojo, a data-driven behavior management technology, reducing student situated behavior into data points offers teachers a promise of simplifying and improving the efficiency of mundane behavior management.

In this light, this paper attends to teachers' experiences of using ClassDojo and their data work in collecting, managing, interpreting, and using student behavior data. Recall that data work consists of forms of technological, analytical, and emotional work that make data meaningful [30]. In our case, we have shown that teachers' data work involves both their direct engagement with student behavior data points and their work impacted by the data. On the one hand, our results revealed that teachers use the behavior data to track and monitor students, while also undertaking the labor of data work to enact both caring for and controlling students. On the other hand, we found that student behavior data render teachers' practices in the classroom visible to parents, school administrators, and students within the wider socio-technical assemblage. The surveilling gazes from these actors exert disciplinary power over teachers, which imposes different norms and expectations on teachers and requires teachers to perform a professional image. And yet, our

results have foregrounded teachers' work in negotiating and resisting these surveilling gazes in order to reclaim their autonomy and legitimacy in determining how to collect student data, how to reconstruct the meaning of the data, how to utilize the data to enact the ethics of care that are fundamental to teacher identity [31, 58, 87], and how to judge what kinds of care and control are suitable for their students.

Taken together, this work contributes insights to the ongoing discussion at the intersection of data work, care work, and invisible work in CSCW scholarship. Situating our findings in CSCW, STS, and neighboring fields, we discuss two forms of data work that are salient in our results but have been overlooked in past CSCW studies: (1) data work as recontextualizing the multiple meanings of data points and (2) data work as resisting surveilling gazes. In doing so, we highlight teachers' struggle over the (in)visibility and autonomy in these two forms of data work, and its potential impact on teachers in the face of data-driven education. Broadly, unpacking these themes should help us better understand the impact on teachers' data work resulted from the growing datafication in education, and vice versa.

6.1 Data Work as Recontextualizing Meanings

The first salient type of data work in our study was teachers' labor in recontextualizing the meanings of student behavior data to enact care. While ClassDojo has been marketed as a technology of affect and care [19] and past critical scholarship has considered ClassDojo as a technology of control that reproduces Foucauldian disciplinary power in modern classrooms [7, 53], our work reveals how both caring and controlling are mediated in teachers' use of the system. Yet, recall from Kim that one of teachers' main goals in using ClassDojo should be "*figur[ing] out a strategy for students who need improvement when looking at data*," instead of simply quantifying and tracking student behavior on the system. For teachers, the behavior data and the datafication process do not provide care themselves. Indeed, feminist scholarship has long considered caring in the classroom as a situational, reciprocal, and collaborative process that attends to the particulars of students' needs and situations [60, 64]. Our work similarly shows that teachers have to take on the labor of data work to enact care in practice, the extent to which care work was still required from the teacher, and how the nature of teachers' care work was shifted with student behavior data. For example, Michele spent time with students to understand the potential socioemotional underpinnings of negative Dojo points, and Sophie sat down with students to make sense and reflect on the behavior data at the end of each week so that she was able to dedicate resources and support in the appropriate way, be it looking into the child's food insecurity at home or addressing the argument between students. This process of recontextualization made space for teachers to translate the data representation back to a more nuanced and complex dimension of meanings—the meanings of both student bodies and caring practices. In this way, teachers recontextualize the complex student bodies, needs, and experiences that are often hidden under each data point, and then they reconstruct and identify the appropriate practices of caring to support the student.

Past CSCW studies advocated for shifting from data-as-care (seeing surveillance data itself as the codified care) to caring-through-data (using surveillance data as the device of developing empathy and compassion and attending to multiple options for care) [43]. In particular, this call-to-shift cautions us of attending to the multiplicity of caregiving practices [60], and that such multiplicity can only be enacted through the ongoing negotiation and articulation work among people, technologies, and data points [43, 67]. Countering to critical scholarship's argument that data-driven solutions often outsource and displace individuals' subject discretion onto technologies [91], our empirical investigation results suggest that teachers take on data work as the opportunity to negotiate their autonomy and discretion in what, when, and how caring practices should be undertaken with

specific students in specific situations. We argue that the data work of recontextualization is critical to enable the shift from data-as-care to caring-through-data.

This understanding of data work as recontextualization helps us better attend to the essential role of human discretion and work in informing data-driven decisions and practices of caring in future CSCW research and practices. In the context of education, recontextualizing student behavior data involves and embodies a wide range of situated experiences, expertise, and knowledge from teachers. Passi and Jackson have shown that professional data analysts have to rely on their situated discretion to negotiate between theoretical reality of the algorithm and empirical richness of the data in their work [67]. Teachers' situated knowledge we described here is hence in line with what data analysts valued in their professional data work. However, the discretionary practices in (oft-informal) data work that orients toward caring can be rendered further under-recognized when compared to those undertaken by professionals, as contested in the literature of feminist ethics [35]. In fact, teachers' caring and nurturing work that is deeply rooted in teachers' everyday emotional and moral commitment has been regarded as what Acker described as "non-work"—a type of work that is often gendered and undervalued [2, 4]. We further argue that the data work of recontextualizing the multiple meanings could further complicate and make teachers' "non-work" invisible, which could perpetuate the discourse that blurs teachers' labor and affect as part of "women's ways" and "moral orientation" [1, 31]. The data work of recontextualization, in a way, corresponds to what CSCW and critical scholarship have described as the invisible reproductive labor (such as the work carried out by nurses, caregivers, technical support specialists, etc.) that is often structured along the lines of gender, race, and more [13, 38, 76, 79].

In their book *Data Feminism*, D'lgnazio and Klein highlighted the importance of "considering context" and power relations in which data are collected, analyzed, and communicated [26]. We agree and suggest that "considering context" is as critical in making sense of the data and translating them into practices, especially in the already undervalued practices of caring. As CSCW increasingly designs data-driven systems in education, health care, and other caring-oriented professions, we need to scrutinize not only how the invisibility of both caring and the data work in preparing for and enacting caring impact informal data workers (such as teachers and caregivers), but also the potential consequences associated with bringing these practices to the fore [79]. While these questions are beyond the scope of the current study, they are critical for future CSCW research to look into.

6.2 Data Work as Resisting Surveilling Gazes

Another salient type of teachers' data work was resisting surveilling gazes from the network of actors in the socio-technical assemblage. Our work has illustrated that teachers' use of ClassDojo and the availability of student behavior data rendered teachers as the subject of surveilling gazes from parents, administrators, and students [36, 53]. Each of these surveilling gazes directly imposed different expectations, rules, and norms on teachers [31, 68]. Teachers discussed how, with the datatification of student behavior and real-time access to the data, these actors created pressures by using student behavior data as a proxy to observe and assess teachers' classroom practices. Recall from participants' experiences that parents expected teachers to manage their children according to parental values and expectations, the administration demanded teachers be competent and professional in behavior management and do their due diligence behind the classroom door, and students expected fairness and consistency in teachers' behavior management. In other words, the behavior data that teachers collected to track students emerged as the data representation of teachers themselves, the indicator of whether they were being professional and taking "good" care of and control over students.

Yet, our investigation highlights teachers' agency in pushing back against the discursive practices and negotiating the autonomy in their caring/controlling practices. Unlike past CSCW findings that external stakeholders' shifting needs erode one's autonomy in determining what data-driven practices should entail [12], we argue that data work *as resistance* makes space for teachers' to enact their own agency and subjectivity. In particular, we have shown how some teachers took on additional articulation work in directly manipulating, and sometimes fabricating, the student behavior data to present an ideal image of themselves. This manipulation involved teachers' calculation in reconciling and satisfying the different expectations from parents, school administrators, and students. Also, the data work of manipulating the behavior data allowed teachers to manage their visibility under surveilling gazes. For example, teachers like Sophie removed parents from ClassDojo to obscure what parents could observe; and teachers like Kim tried to track minute student behavior in order to make their work and practices more legible to the school administration and get more professional support. In both cases, teachers manipulated the visibility to reclaim their autonomy and legitimacy in the caring processes from surveilling gazes.

In our context, data work as resistance is not so much a process that completely dismantles the discursive practices and power over teachers. Instead, it is a process for teachers to compromise, reconcile, and negotiate the trade-offs between performing (i.e., doing what is expected from institutions) and caring (i.e., doing what they deem is best for children) [31]. Both the aspects of performing and caring were encountered and contested in the abstract student behavior data. To this end, data work as resistance resonates with what Star and Strauss referred to as "backstage work" in which teachers intended to remain invisible from scrutiny [76]. Backstage work allows people to hide the messiness of the preparation work from public display [32, 76]. We extend this understanding and suggest that the backstage data work as resistance also allows teachers to strive for more room for the backstage, where they are able to enact subjectivity and autonomy in caring practices. Such conditioned autonomy is only made possible by teachers' work in "manipulating indicators" that are confronted by those "who never see the work situation first hand" [76, p.15]—and in our case, parents and school administrators who are not in the classroom. As such, the understanding of data work as resistance calls attention to the process of how the data representation as the boundary object between surveillants and the surveilled was crafted, what kinds of negotiation, judgment, and power interplay are embodied in the construction of data representation, and how boundaries between surveillants and the surveilled are being probed and pressed in this process.

Furthermore, our results suggest the increasing emotional labor experienced by teachers in doing data work as resistance. Recall that participants like Aubry and Ciera expressed feelings of frustration, struggle, and anger in their use of ClassDojo when they were confronted and pushed back by the network of actors. The constant calculation and negotiation of autonomy and legitimacy through data work can be simultaneously disempowering and empowering [81], and the undertaking of data work as resistance could lead to further burden and stress on already overloaded teachers [6]. Indeed education sociologist Stephen Ball warned us that the tensions between teachers' performing and caring could lead to ontological dilemmas among teachers:

> *Are we doing this because it is important, because we believe in it, because it is worthwhile? Or is it being done ultimately because it will be measured or compared? It will make us look good! Do we know we are good at what we do, even if performance indicators tell a different story... Again, much of this reflexivity is internalized.* [5, p.220]

With the growing datafication in education and the use of data-driven technologies like ClassDojo, we speculate this tension between caring about children and "caring" about surveillants could be further intensified and omnipresent. In this light, future research should advocate for and make visible teachers' internalized reflexivity [5]. At the same time, there are opportunities for CSCW

researchers to attend to teachers' increasing emotional labor and its impact on teachers' lived experience outside the classroom [37] and their collaboration with other stakeholders [86].

Overall, data work is often conceived as a set of processes with limited embodied autonomy under monitoring and control [12, 72, 91]. We unpacked teachers' data work in collecting, managing, and using student behavior data to enact care and control, and we revealed that data work consists of a potential to rethink resistance in light of datafication. This way, our work adds nuances to the notion that teachers have become partially "robotized" in that their subjectivity has been displaced by data and data-driven technologies [91]. Even though it is hard to say how much data work as recontextualization and resistance can bring about change and shift the discursive practices, we argue it is critical for CSCW research to recognize and advocate for informal data workers' (in our case, teachers') agency and potential of negotiation. Otherwise, overlooking this ongoing negotiation of autonomy in data work risks further foreclosing the room for resistance and rendering the very agency further invisible.

7 LIMITATIONS

Our study has three limitations. First, our participants were recruited through online recruitment and snowball sampling. While our sample included teachers from different backgrounds, teachers in varying regions and those who were not active on social media might have different experiences. Future work could compare and contrast teachers' experiences across different contexts and regions. Second, because of the COVID-19 lockdown, it was impossible for us to conduct in-person field work and observation, and we welcome further research through ethnography and participant observation to compare and contrast. Third, teachers' responses in our interview could have resulted in desirability bias [33]. While we stressed the confidentiality of their personal and organizational information, teachers might have chosen to provide answers that they deemed more socially desirable during the interviews.

8 CONCLUSION

In this paper, we presented a qualitative study on teachers' data work in collecting, interpreting, and using student behavior data to enact both care and control. In the process of monitoring student behavior, teachers found themselves subject to the surveilling gazes from a network of actors, including parents, school administrators, and students. These actors all imposed different norms and expectations on teachers, which in effect disciplined teachers in their practices of controlling and caring.

Our analysis located and unpacked two salient forms of data work and added nuances to the understanding of data work in CSCW: (1) data work as recontextualizing the meanings of abstract data points and (2) data work as resisting the surveilling gazes from the network of actors and discursive practices. Our work interrogated the dominant view that data and datafication displace teachers' discretion and autonomy in data work. In fact, data work as *recontextualizing meanings* and data work as *resistance* allow us to foreground the ongoing negotiation of autonomy among teachers, other human actors, digital artifacts, and data objects. Bringing this negotiation of autonomy to the fore urges future CSCW work to recognize and advocate for data workers' (especially informal data workers who involved in oft-invisible caring work) agency in resistance in light of datafication.

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