Physics Teachers' Perceptions of Administrative Support for Professional Learning During COVID-19

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Abstract

There is an overwhelming consensus that sustained opportunities for teachers' professional learning is critical for student success, but due to the COVID-19 pandemic, the nature, substance, and format of K-12 teachers' opportunities for professional learning necessarily shifted. District administrators, focused on maintaining the safest possible learning environment, responded to local health considerations and policies and made decisions about district-provided professional development. These decisions had far-reaching effects, and through this qualitative case study research we sought to better understand how high school physics teachers' perceptions of administrative support during COVID-19 impacted their opportunities for professional learning. We analyzed interviews with four veteran physics teachers and found that all four were able to succinctly name the problems they faced during the 2020-2021 school year, but the ways in which they felt supported by administrators to address their problems was varied, yet impactful. The four cases we present serve as reminders that (1) teachers are acutely aware of their own needs; (2) teachers can serve as resources within their district; and (3) developing and main-

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taining a positive framing for continued professional learning encourages a culture of instructional excellence.

Keywords: teacher education, professional learning, professional development, physics, science teaching, COVID-19

Introduction

There is an overwhelming consensus that sustained opportunities for teachers' professional learning is critical for student success (Desimone, 2009; Little, 2006; Luft & Dubois, 2015). In the United States, K-12 school-based administrators often decide the focus of district-provided professional learning opportunities, but due to the COVID-19 pandemic leading up to and during the 2020-2021 school year, the nature, substance, and format of teachers' opportunities for professional learning necessarily shifted (Clausen et al., 2020; Manfra et al., 2020; Sadler et al., 2020). While administrators, students, and teachers across grade levels and subject areas were impacted by the pandemic, science teachers—many of whom utilize laboratory-based instruction—faced unique challenges to maintain a safe learning environment (Kelley, 2020). Throughout the 2020-2021 school year, questions persisted around social distancing, best practices for sanitization of shared laboratory equipment, and management of in-person, hybrid, and fully online teaching and learning contexts.

While many of these uncertainties impacted all teachers across all grade levels, physics teachers—many of whom regularly teach more than one subject—were faced with the heavy lift to modify instruction across multiple subject areas. However, due to small district sizes and/or their specialized area of content expertise, these teachers are also (a) structurally isolated from other physics teacher-colleagues and (b) often lack opportunities to collaborate around physics-specific topics in ways that may be afforded in other disciplines and in larger districts (Langer Tesfaye & White, 2012). This isolation can have negative impacts on student learning (Krakehl et al., 2020). As such, science teachers in smaller and/or rural districts frequently rely on external sources of professional development as well as professional networks of teachers from across districts in order to support their subject-specific learning and, ultimately, their teaching.

The impacts of COVID-19 necessitated changes to the substance and format of professional learning for all teachers entering the 2020 school year (Hartshorne et al., 2020). K-12 administrators, focused on maintaining the safest and best possible learning environment for students, responded to local health considerations and policies and neces-

sarily made decisions about instructional format as well as opportunities for district-provided professional development for teachers. These decisions impacted teachers, and through this qualitative case study research we sought to answer the following research question: *How do high school physics teachers' perceptions of administrative support during COVID-19 impact their opportunities for professional learning?*

Literature Review

Professional Learning

In the state where we conducted this research, all K-12 school districts are required to provide every teacher at least five days of professional development, annually. In addition to district-decided and -provided professional development, many teachers seek additional opportunities to further their own learning from colleges, universities, or other non-school-based providers. Collectively, these opportunities for professional learning are important to teachers in order to support instruction that is ambitious, effective, and responsive and inclusive to all students (Little, 2006) and are key to improving the quality of schools (Desimone, 2009; Desimone et al., 2013).

Teachers' development through collegial collaboration is an important part of professional learning, and all teachers should have opportunities for extended talk about episodes of pedagogical reasoning with their colleagues (Horn, 2010; Horn & Little, 2010). Professional learning communities (PLCs), a group of teachers within a school engaged in discussions about teaching as a means to improve their work, as an example, have the potential to help support teachers' attention to students and their learning by creating structures to foster a collaborative culture among participants and focusing on outcomes and results (DuFour, 2004; Friedrichsen & Barnett, 2018; Graham, 2007). Yet, particularly for teachers in urban, small, and/or rural districts in which there is only one teacher for each discipline, focusing the substance of such building-based conversations on subject-specific content and practices can be structurally difficult, if not impossible (White & Tyler, 2014).

External opportunities for professional learning are also important, as they can support deep engagement in subject matter (e.g., research experiences for teachers; Rebull et al., 2018; Schneider et al., 2018) as well as the development of professional networks among colleagues from other districts (Prenger et al., 2017). This is particularly relevant for science teachers at small schools and for physics teachers, especially, as there are structurally limited opportunities to collaborate on subject-specific topics within a given district. However,

external opportunities for professional learning were also impacted by COVID-19, and many paused or shifted in format as the pandemic unfolded (Hartshorne et al., 2020).

Isolation

It is unfortunately commonplace that many physical science teachers across urban and rural secondary school contexts lack subject-matter colleagues in their schools (Langer Tesfaye & White, 2012; Padwa et al., 2019; White & Tyler, 2014). This structural isolation constrains opportunities for collegial interactions, which have long been known to restrict teachers' professional development and growth (Goodlad, 1983) and, ultimately, improve their science instruction (Rodriguez, 2015). Indeed, isolation has been framed as one of the most significant obstacles constraining broad scale improvement in education (Lortie, 1975). Drawing on the expertise and skill of retired teachers is one model to support early career teachers who teach alone in their buildings (Cottle, 2021). However, structuring content-focused PLCs within schools, which research shows supports peer-to-peer interactions and improved instruction (Herrington & Daubenmire, 2016), for physics teachers beyond their induction years remains a challenge.

Rural science teacher isolation is not always correlated with lower student performance. Two related studies across high school chemistry and physics contexts, respectively, illustrate an interesting finding. According to Padwa et al. (2019), "students of isolated chemistry educators tended to exhibit weaker chemistry performance on the state chemistry exam than of those of non-isolated teachers" (p. 2389). However, students in rural, isolated physics teaching contexts tended to outperform their non-rural peers, suggesting there may be "underlying pedagogical and school characteristics that should be explored in those contexts" (Krakehl et al., 2020, p.13). In both studies, the authors agree that isolated teachers require access to high-quality professional development opportunities, but nevertheless it's worthwhile to work toward identifying and developing a more complete understanding of school-level characteristics that may ultimately better support student success.

Teacher Leadership and Tensions Surrounding Teachers' Professional Learning

One way to support teachers' continued professional learning is through in-school teacher leadership networks, but these roles can also induce tension across teachers and between teachers and administrators due to positionality and conflicting goals. Teacher leadership is

broadly understood to be an important part of any school improvement task (Cheung et al., 2018), and there exist a handful of models in which to structurally enact informal and formal teacher leader roles (e.g., Cosenza, 2015; Lotter et al., 2020; Teacher Leader Model Standards, 2011).

Teachers can serve as informal leaders by co-planning and/or talking in the hallways or the teachers' lounge with colleagues (Lotter et al., 2020), but in cases where teachers are isolated by subject area (e.g., physics, chemistry, etc.), such informal conversations with local peers can lack the disciplinary substance that is an important part of continued professional learning. Formalized teacher leaders can serve as catalysts to support new pedagogies or philosophies (e.g., NGSS-based implementation of engineering practices; Christian et al., 2021). However, formalizing such roles can lead to conflict since teachers often "think of themselves as belonging to the same organizational hierarchy," and, as such, "giving a special role to some teachers can easily lead to tensions among peers" (Cheung et al., 2018, p. 39).

Tensions can also surface between teachers and their building or district-level administrators, regardless of the formalization (or not) of school-based leadership networks. Even in contexts in which school administrators and teachers agree on big-picture, long-term goals of professional learning, maintaining an atmosphere of trust and open communication is challenging due to the evaluative structures in teaching as well as turnover in leadership, the latter being especially prevalent in rural contexts (Tran & Dou, 2019; Zinger et al., 2020). Adah Miller et al. (2023) suggest one way to support the enactment of new pedagogies is to position teachers as equals with their administrators, thereby supporting them as "epistemic agents" (e.g., Luft et al., 2019) in shaping all aspects of the school environment. This positioning would involve the creation of systems to structurally support shared decision-making, which can be challenging in times of increased administrator and/or teacher turnover.

Methods

Participants

To answer our research question we recruited, by e-mail, high school physics teachers at public schools from within 50 miles of our institution to participate in semi-structured online interviews about their opportunities for professional learning before and during the COVID-19 pandemic. Of the 27 teachers we contacted, four respondents taught at least one section of high school physics during the 2020-2021 academic year, provided informed consent, and were ulti-

mately selected to participate. The study was approved by the Alma College Institutional Review Board (IRB# R_Pt8LxzhFgm5wr85) on July 8, 2021. All participants provided written informed consent prior to participating in this study.

All four teachers were experienced (i.e., 25-33 years of classroom teaching). Two participants—Megan and Steve; both pseudonyms—taught at small public high schools in rural counties in the upper Midwest, as designated by the United States Census Bureau. Their schools were located in small, rural communities, with populations of approximately 1,000 and 7,000 residents, respectively. The other two participants—Sam and Mark; pseudonyms—taught at larger public high schools located in different counties designated as urban. Sam's high school was in a rural "bedroom community," with a population of approximately 7,000 but located 20 miles away from a large, metropolitan city and drew students from a relatively large geographic area. In contrast, Mark's students lived in or around a large suburban city that maintained two large public high schools to serve its population of over 40,000 residents.

Despite differences in population size and county designation, all four teachers taught in schools serving a majority White population of students. Additionally, all four school districts adopted a hybrid instructional format in order to respond to the seemingly constant flux of students, teachers, administrators, and staff out with or quarantined due to COVID-19. Socioeconomic differences were certainly evident across the districts. For example, Sam and Mark's schools served students who, as a whole, had more economic advantages than students at Megan's and Steve's schools, as evidenced by qualification for free or reduced-price lunch (FRL). See Table I for further detail about each teachers' context.

Data

In order to better understand how high school physics teachers' perceptions of administrative support during COVID-19 impacted their opportunities for professional learning we conducted a qualitative multiple case study analysis on semi-structured interviews with each teacher. The primary goal of this type of research is to identify and report descriptions and overarching themes across cases (Maxwell, 2013; Yin, 2009). The data sources for this study are transcriptions of each interview, in which they were prompted to describe their opportunities for professional learning before and during the 2020-2021 academic year and the impact of these opportunities (if any) on their teaching.

The online interviews with each teacher, conducted by the second author, ranged in duration from 26 to 52 minutes ($M = 40.41$, $SD = 11.26$). Despite no pre-planned prompting, all four teachers also discussed, at length, their perceptions of how opportunities for professional learning were shaped and/or impacted by district administration, which is the focus of our current research.

Table 1
Context

Teacher	*Subjects Taught*	*County Context*	*2020-2021 Total High School Enrollment*	*%FRL*	*Student Demographics (District)*
Megan	Physics Mathematics Biology Anatomy Chemistry	Rural	335	49%	91.73% White 5.83% Hispanic/ Latino 1.94% 2 or more races
Steve	Mathematics Physics	Rural	327	63%	81.80% White 13.54% Hispanic/ Latino 2.33% 2 or more races 2.01% African American
Sam	Introductory Physics Advanced Placement Physics	Urban	931	18%	85.76% White 8.06% Hispanic/ Latino 4.18% 2 or more races 0.88% African American 0.69% Asian
Mark	Introductory Physics Advanced Placement Physics	Urban	1,245	37%	84.21% White 5.00% Hispanic/ Latino 4.59% 2 or more races 3.44% Asian 2.10% African American

Note: Context determined by U.S. Census Bureau classification. Total high school enrollment, %FRL, and demographics are listed according to MI School Data (https://www.mischooldata.org) as of the time of submission for publication.

Coding

When we began this study we were interested in identifying if and how shifts in opportunities for professional learning impacted teaching, so we initially separately coded transcriptions of all primary data with literature-informed, a priori codes about 1) professional development and 2) impacts on teaching practices (see Table II). After coding each transcribed interview we met to review the coded data, resolve any differences, and discuss emergent themes. Two important themes surfaced from our analysis and are worth highlighting: 1) Isolation (ISO) and 2) Administrative influence on professional learning opportunities (ADM). Based on these themes we added to our a priori codes (emergent codes are indicated with an * in Table 2) and re-coded the data.

Analysis

After coming to consensus on all coded data, we then analyzed the coded data to identify if and how these codes co-occurred and collaborated to write, and rewrite, memos describing if and how high school physics teachers' perceptions of administrative support during COVID-19 impacted their opportunities for professional learning.

Table 2
Codes for Teachers' Professional Development and Impact

Code	*Sub-code*	*Definition*
Features of Professional Development	CR	T is referring to content-related PD
	TR*	T is referring to technology-related PD
	PR*	T is referring to pedagogy-related PD
	CP	Collective participation (among others in the T's building/district)
	D	Duration (i.e., one-shot, multi-day, etc.)
	C	Coherence (i.e., consistent with prior knowledge and/or district, building expectations)
	AP	Active participation (T and colleagues are actively participating in the PD; not passive)
	SR*	T is referring to PD that is socially-focused
Impact	LP	T indicates PD had an impact on lesson planning
	TC	T indicates PD had an impact on teacher collaboration
	ISO*	T indicates isolation impacts teaching, lesson planning, collaboration, and/or opportunities for professional learning
	ADM*	T discusses district and/or administrative influence on PD

From these memos we co-wrote detailed descriptions of each teacher's case and used these descriptions to identify similarities and differences, which we present as findings, below.

Findings

In the sections that follow we describe how each teacher's perceptions of administrative support during COVID-19 impacted their opportunities for professional learning, and discuss themes that have emerged across cases. We present findings as clustered stories to illustrate important differences in perceptions of administrative support: Megan and Sam were both isolated and resourceful, yet felt empowered in a context that valued teachers' existing and developing expertise; Steve and Mark were also isolated but lacked administrative support to address their and their colleagues' perceived and ongoing challenges.

Megan and Sam: Isolated and Empowered

Megan

A long-time veteran of her small, rural high school and one of only two science teachers in her building, Megan regularly taught physics, math, biology, anatomy, and chemistry courses. Before the pandemic Megan routinely sought external opportunities for professional learning in order to supplement her district's regular offerings, noting that "it's hard when you're the only chemistry teacher or the only physics teacher" to collaborate over subject matter with colleagues. For example, in order to improve her instruction Megan previously participated in condensed two week-long science content courses at a nearby university as well as a year-long program focused on teaching in ways that are in-line with expectations of the *Next Generation Science Standards* (NGSS Lead States, 2013). While these (in-person) professional development opportunities were rarely physics-specific, Megan felt she was able to apply many of the things she learned to her classroom teaching and that, as a whole, they supported her professional knowledge.

Prior to and during the pandemic, Megan felt her building principal positioned her and other experienced teachers as being knowledgeable and having expertise worth sharing with other teachers. For example, Megan appreciated having the opportunity to present to district-wide colleagues about computer-based simulations in science. Within her small school, Megan also enjoyed supporting new teachers through classroom-based cycles of observation and feedback.

In the Fall 2020 semester, Megan's district opted for a hybrid (but mostly in-person) learning environment. In addition to her district-provided professional development, Megan felt supported by her building principal to seek out additional external virtual professional development to improve her assessment practices and laboratory instruction in light of anticipated COVID-related challenges. For example, Megan sought out professional development sessions focused on using *Google Forms* for paperless assessment from a neighboring district, and she shared what she learned while regularly collaborating with the other biology teacher in her building to write and administer biology exams for their hybrid classes. Additionally, Megan sought out multiple webinars provided by a large science equipment company in order to learn how to more safely conduct laboratory investigations during the pandemic, which helped inform her laboratory practices in the 2020-2021 school year. Overall, despite being isolated Megan was resourceful and felt empowered to seek (and share) opportunities for professional learning from beyond her district that addressed her immediate needs.

Sam

Like Megan, Sam is also a veteran teacher who is the only physics teacher at his school, which is located in a rural bedroom community 20 miles outside of a metropolitan city. Sam's school draws from a larger geographic area than Megan's, and as such the average graduating class size at his school was almost three times larger than Megan's. Despite the town's relatively small population (approximately 7,000 residents), Sam's school size afforded him to teach a full schedule of physics.

Prior to the pandemic Sam worked with a large public university on a physics education research project alongside eight other physics teachers. Sam stayed in touch with many of those teachers after the program concluded in order to continue sharing ideas about teaching and learning physics, but he admitted those connections waned over time. Locally, Sam appreciated his administrators' continued interest and willingness to elicit his and his colleagues' professional development needs and structure teacher-led sessions based on those needs. While Sam's building-based science-focused collaborations were typically limited to discussions about grading, test scores, and standards coverage, over his career he learned to apply general teaching techniques from his building-based colleagues to his physics instruction.

Leading into the 2020-2021 school year, Sam indicated that the majority of opportunities for professional learning provided by his district were about adapting to immediate challenges of the pandemic,

but were—importantly—always informed by teachers' needs. Topics ranged from learning how to use online meeting software to learning how to involve students in both online and in-person in classrooms activities at the same time, as Sam's school also necessarily adopted a hybrid model to accommodate students temporarily learning from home. Sam reported that these sessions were helpful, as previously he had never hosted a virtual meeting let alone taught a hybrid class, but he lamented that they did not prepare him for the full gamut of challenges the coming year would bring.

To help combat some of these unforeseen challenges during the school year, Sam's administration provided teachers with permanent online meeting links, which he and other teachers often spontaneously utilized in order to discuss new ideas about how to better accommodate online students in classes with the majority of students attending in-person. Sam reflected that his administrators "really wanted to make [professional development] useful" and elicited ideas that supported "everybody to help everybody." For example, despite being the only physics teacher in his building, Sam felt he was still able to get good tips on managing a hybrid classroom from other teachers through informal drop-in online meetings. For Sam it was important that his administration did not attempt to control these pop-up conversations between teachers. Instead, he felt the principal recognized that teacher collaboration was going to be an important but structurally challenging thing to continue during the pandemic, and providing permanent online meeting links for teachers allowed many to collaboratively find creative solutions to their continually evolving challenges.

Steve and Mark: Isolated and Constrained

Steve

Similar to Megan, Steve taught both math and physics in a small rural high school and—before the pandemic—regularly sought opportunities for professional learning. For example, in the five years leading up to the pandemic, Steve worked with several PLCs—both within and outside of his school—to help him improve his teaching. Steve's school-based PLC included science colleagues who met regularly to discuss teaching methods, students' senior-level research projects, and students' performance on school-wide common assessments. Like Megan, Steve also participated in professional development programs offered by nearby public universities before the pandemic, and found those to support "useful collaborations" since they were both centered in physics. Additionally, Steve regularly attended and/or presented at

the state-level science teachers association meeting, as he found those helpful contexts in which to learn from other physics teachers.

The start of the pandemic affected Steve greatly. Like the other teachers in this study, Steve's school also adopted a hybrid approach in the fall semester in order to accommodate students and staff with or quarantined due to COVID-19. However, at school Steve felt entirely cut off from other teachers due to decisions at the district level, and he felt the entire district was perpetually "in crisis mode." For example, Steve reported that the school had inadvertently encouraged "collegial segregation" among teachers by separating them during lunch periods—a time when Steve would frequently but informally collaborate with his fellow teachers—and their hybrid instructional model did not include structural time to talk with other teachers. Additionally, Steve indicated that district leadership took over all regularly scheduled (monthly) PLC time in order to provide district-wide information on COVID-19 and their response plans. This decision was particularly divisive for Steve because he highly valued his school-based PLC as a context in which to hear from peers and "capture the wisdom of everyone in the room," which could have included conversations about how they were collectively managing instruction.

Between this lack of PLC time and his perception of disconnectedness among his building-based colleagues, Steve felt his administrators' decisions negatively impacted his opportunities for professional learning during the school year. While on one hand Steve appreciated his district's efforts to keep students and staff healthy and safe, he lamented the loss of opportunities to collaborate with other teachers and was critical of his district's ability to support teachers' needs during the pandemic.

Mark

Mark taught at one of two mid-sized suburban high schools in a town of approximately 40,000 residents and is one of two physics teachers in his building. Both high schools are well-resourced and the sciences (in particular) have broad community support. Before COVID-19, Mark indicated he would attend and/or co-coordinate professional development meetings for his school, as he formerly served as the head of the science department. At this point in his well-established career, Mark indicated that he very rarely attended professional development that impacted the way he approached teaching. Unfortunately, Mark indicated this lack of uptake was due to limited time and a lack of time and incentive to "carry through" the professional development

work into his classroom, as well as a lack of district-wide accountability. However, he appreciated attending these meetings with his peers because—before COVID—such meetings provided opportunities to collaborate and build better relationships with his building-based colleagues. For Mark, these opportunities to bond with his fellow teachers were important as those relationships "can [pay] dividends, in a sense, throughout the year."

During COVID-19, Mark reported that there were no district-provided opportunities for professional learning that were focused on science, curriculum, or on teaching online because the district primarily maintained an in-person instructional format (despite some students intermittently learning from home and two unplanned mid-semester district-wide closures that necessitated fully-online instruction). Instead, the district determined the focus of that year's professional development would continue to address locally important issues, such as Black Lives Matter and "social awareness." While Mark indicated the district's offerings did ultimately have an effect on the way he talked to his students, he noted that the virtual format of these sessions curtailed his ability to build relationships with his school-based colleagues, and continually felt isolated despite his mid-sized school setting. Overall, Mark felt that he struggled to effectively teach those students who needed to join online and that the lack of opportunities for professional learning focused on online teaching ultimately had a negative impact on his students' learning.

Discussion

These four cases elevate several important implications as we look forward to better supporting teachers' professional knowledge in the future. Arguably, all four teachers described and exhibited a stance for learning and dedication to students—despite unprecedented challenges associated with the COVID-19 pandemic—that is admirable. It's important to again note that all four teachers were able to draw on almost three decades of prior experience teaching in their responses to our questions, and that all indicated that a school-based culture of support was important to their work.

One interesting pattern that surfaced across our interviews was that all four teachers were able to succinctly name the problems they faced during the 2020-2021 school year, but the ways in which they felt supported to address their problems was varied, yet impactful. As can be seen in both Megan's and Sam's cases, they perceived that their administrators did not impede them from doing the things that they

needed in order to fix the problems that they identified. Rather, they both felt their building and district-level administrators encouraged a culture of finding solutions—either from within (Sam) or outside (Megan) of the district—and generally valued their teachers' expertise and professionalism.

This perceived positioning is similar to that as elevated by Adah Miller et al. (2023) in which teachers are consciously positioned both as "epistemic agents" (e.g., Luft et al., 2019) and equals with their administrators, which helps positively shape the school environment. As can be clearly seen in Sam's story, he felt his administration actively created systems to structurally support shared decision-making that leveraged internal expertise and teachers' needs (e.g., determining the focus of professional development), which he appreciated.

Steve and Mark, however, both felt constrained by their administrators' decisions to curtail opportunities for collegial talk. While the 2020-2021 academic year was undoubtedly one of the hardest years on record for many teachers, Steve and Mark both felt their administrators' decisions resulted in further isolation, and their morale suffered. Steve's perception of administration-directed structural isolation further cemented him to feel alone in his work—something that is not uncommon in rural secondary school contexts (e.g., Langer Tesfaye & White, 2012; Padwa et al., 2019; White & Tyler, 2014). Mark, however, was quite used to and appreciated collaboration amongst his building and district-based physics teacher colleagues, and arguably the feeling of isolation during COVID was somewhat new to him. Both Steve and Mark felt their administrators' decisions constrained in their ability to serve as informal leaders (Lotter et al., 2020) among colleagues, and described elevated tensions between teachers and their building or district-level administrators. These tensions arose out of disagreements in short-term goals of professional learning, which further served to erode trust and communication.

As we consider and still learn from the magnitude of uncertainty surrounding the 2020-2021 school year, these four cases echo the simple fact that teachers feel the need to have supportive administration in order to enact school-level reforms (Christian et al., 2021). Turnover across teachers and district leaders, which is historically commonplace in rural contexts (Tran & Dou, 2019; Zinger et al., 2020) and especially prevalent as schools rebound from COVID-19, restricts the ability of systematic structures to support shared decision-making.

Limitations and Future Research

The findings we present in this article serve to elevate teachers' voices and potentially complicate the decisions around the district and administrators' roles in supporting teachers' professional learning. However, the cases we draw from to elevate stories are not necessarily generalizable across other physics teachers—let alone other science teachers. Questions persist around the needs across teachers' perceptions in different subject areas and grade levels (middle vs. elementary vs. high school). In what ways are their needs similar and different to those elevated in the context of the high school physics teachers in this article?

At the time of publication, one of the four case teachers included in this study has retired, and three of the four high schools have onboarded one or more new building principals. As such, opportunities to again connect with these case teachers—and potentially their administrators—is limited, but would be worthwhile to explore in other contexts. We are left wondering, to what extent and in what ways would our case study teachers' stories align with those of their administrators? In what ways might these findings mirror or elucidate new challenges or discontinuities associated with supporting teachers' professional learning in our current post-COVID context?

Conclusion and Practical Implications

The findings of this research have practical implications for professional development providers and district and school-based building administrators who shape professional learning opportunities for teachers and add to our developing understanding of the impact of COVID-19 on teachers' professional learning. As we consider how to best support all teachers' professional learning moving forward these four cases serve as reminders that 1) teachers are often acutely aware of their own needs, 2) teachers can serve as resources to others within the building and district, and 3) developing and maintaining an environment of value and support for continued professional learning is helpful in creating a culture centered on instructional excellence.

While these findings help to unpack similarities and differences in teachers' perceived needs and challenges, it also elevates a tension seen across K-12 contexts related to the extent to which teachers and administrators can move forward in productively and collaboratively solving problems. The stories of Megan, Sam, Steve, and Mark collectively serve to highlight the inherent affordances and challenges associated with positioning teachers as agents of change within their buildings.

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