The Design and Impact of Remote Professional Development on Computer Science Instructional Coaching and Teaching in Chicago Public Schools During COVID-19

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Executive Summary

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This report presents outcomes of a RAPID Collaborative Research grant that supported a professional development series (“NEXT”) for high school Exploring Computer Science (ECS) teachers in Chicago Public Schools (CPS) during the 2020–2021 school year. The project aimed to develop processes and actions to mitigate the impact of remote instruction on students’ access to high-quality and equitable computer science (CS) instruction. The Chicago Alliance for Equity in Computer Science (CAFÉCS), a long-standing partnership between university computer science faculty, educational researchers, and CPS teachers and administrators, designed a series of professional development (PD) workshops for teachers, a coaching model with various one-on-one and group coaching options, and a professional learning community (PLC) to build coaches’ capacities to support teachers during the pandemic. Drawing on qualitative data, we analyzed instructional coaches’ and teachers’ experiences with remote PD during COVID-19. The instructional coaching team designed PD workshops and coaching structures around key ECS instructional strategies and prioritized teachers’ emotional needs throughout the pandemic-impacted school year. Teachers reported that focusing on key instructional strategies helped (re)ground them in the ECS framework and build community with and among students in the remote environment. Moreover, teachers felt emotionally supported by their coaches and gained a sense of community with other CS teachers. Findings suggest that districts should design PD to meet teachers’ instructional and emotional needs and invest in instructional coaches’ professional development.
The COVID-19 pandemic caused unprecedented disruptions and uncertainty to schools worldwide in 2020–2021. School closures and remote instruction raised significant concerns about students’ mental health, access to equitable education, and ability to remain on track for high school graduation. These concerns were particularly acute in Chicago Public Schools (CPS), the nation’s third largest district, and first of its kind to establish computer science (CS) a graduation requirement in 2016 (Barrow et al., 2020). Among the many challenges brought on by the pandemic, inequities in CPS students’ access to remote CS education could negatively impact their abilities to graduate from high school on time.

As CPS and districts across the U.S. shifted to remote instruction in March, 2020, the Chicago Alliance for Equity in Computer Science (CAFÉCS), a long-standing partnership between university computer science faculty, educational researchers, and CPS teachers and administrators, received a RAPID Collaborative Research Grant from the National Science Foundation (NSF). The project – “Mitigating the Impact of Forced Remote Learning of Exploring Computer Science (ECS) due to COVID-19” – focused on supporting CS teachers who teach Exploring Computer Science (ECS), an inquiry-based, introductory CS course. Approximately 70% of CPS students take ECS to fulfill the high school graduation requirement (Dettori et al., 2022). The project extended the ongoing work of CAFÉCS to ensure that all CPS high school students experience high-quality, engaging CS education by developing strategies for the remote classroom environment that emulate effective in-person classroom experiences.

This report focuses on the first two research questions that guided the project: 1) How can we design online professional development to support ECS teachers’ transition to teaching
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the course fully or partially online during the 2020–21 school year? 2) How can the CAFÉCS coaching model be adapted to support teachers in moving ECS to a remote learning format and to provide remote coaching when school access is restricted? In a separate report, we will address the project’s final research question: What are the characteristics of remote learning policies that foster student engagement and best support student online collaboration?

To examine how instructional coaches designed and how teachers experienced remote professional development during the pandemic, we analyzed qualitative data collected throughout the 2020-2021 school year and teacher interviews conducted in the spring and summer of 2022. In what follows, we first describe the professional development series, Navigating Remote ECS Teaching (NEXT), which was designed in accordance with Desimone & Garet’s (2015) framework for effective professional development. Next, we overview our methodology for understanding teachers’ and instructional coaches’ experiences with the NEXT series. We then present our findings. We found that while the instructional coaching team designed professional development and coaching around key instructional strategies, they were equally concerned with providing emotional support to teachers throughout the pandemic school year. Teachers expressed that focusing on key instructional strategies helped (re)ground them in the ECS framework and build community with and among students in the remote environment. At the same time, they also described feeling supported “as people” by their coaches and gaining a sense of community with other CS teachers. We conclude with implications for research, policy, and practice.

**Designing the NEXT Professional Development Series**

CAFÉCS developed the NEXT professional development series to support ECS teachers with their implementation of equitable and inclusive instructional strategies for the remote
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learning context, and to encourage peer coaching and collaboration among ECS teachers. These efforts were led by Gail Chapman (Exploring Computer Science) and Kirsten Peterson (Education Development Center), CPS instructional coaches, Valerie Curry and Don Yanek, CPS program manager, Andrew Rasmussen, and CPS project coordinator Jeremy Gubman. The design of NEXT was guided by Desimone and Garet’s (2015) framework, which outlines five core tenets of effective professional development: 1) content focus; 2) engagement; 3) coherence with schoolwide goals, teacher knowledge, student needs, and local conditions; 4) collective participation; 5) sustained duration.

In accordance with the Desimone & Garet (2015) framework, CAFÉCS designed and implemented five workshops throughout the 2020–2021 school year. In August 2020, the team held a two-day workshop with the aim of helping ECS teachers re-center their understanding of the ECS philosophy, discuss instructional strategies for recreating the ECS experience online (e.g., strategies for synchronous collaboration), and make social-emotional connections with students. Following these two summer sessions, CAFÉCS held quarterly workshops in October, December, March, and April, which primarily focused on adapting effective instructional strategies (e.g., pair programming, journaling, and think-pair-share) for remote instruction and supporting teachers’ use of Google suite tools to implement those strategies. The coaching team shared responsibility for designing and delivering the quarterly workshops. In addition, the quarterly professional development workshops encouraged participants to develop a professional learning community (PLC) for computer science teachers through peer coaching and collaboration. Table 1 shows the dates of each workshop and the number of teachers who attended each workshop. Although feedback surveys showed that teachers were generally
satisfied or highly satisfied with the workshops, workshop attendance declined over the course of the school year.

Table 1

<table>
<thead>
<tr>
<th>Date</th>
<th>Participants</th>
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<tr>
<td>August 24–25, 2020</td>
<td>22</td>
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<td>October 21, 2020</td>
<td>15</td>
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As part of the NEXT series, teachers had several options for accessing instructional coaching: a Coaching Café, a Teachers’ Lounge (Google classroom forum), and a teacher peer coaching program based on the GROWTH framework. Designed as a PLC, the Coaching Café provided opportunities for teachers to engage in informal but structured discussions about different pedagogical topics. The Teachers’ Lounge was designed to provide opportunities for small groups of ECS teachers to collaborate with the coaches on effective practices and teaching strategies regarding specific ECS lessons and computer science content. Teachers who participated in the peer coaching program partnered with another ECS teacher and met monthly to discuss their practice, using the Goals, Reality, Options, Will, Tactics, Habits (GROWTH) framework to guide their collaborative work.

Finally, the RAPID grant supported instructional coaches’ professional growth. To build the capacity of the coaching program, Chapman and Peterson met with CPS instructional coaches, Yanek and Curry, twice a month as part of a Coaching PLC. These meetings were organized around several goals: to reflect on teachers’ feedback from the previous workshop, discuss teachers’ needs, plan for the subsequent NEXT workshop, and develop a set of coaching
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strategies for the remote learning environment. At the end of each meeting, Gail, Kirsten, Don, and Valerie (hereafter, the “coaching team”) revisited and updated the coaching strategies document. Kirsten also summarized the group’s discussion into generalized meeting notes with the goal of capturing the groups’ concerns and experiences at a specific time point while preserving anonymity for the coaching team.

Methods

To analyze the impact of the professional learning opportunities on CS instructional coaching and teaching, we conducted several phases of qualitative and quantitative analysis. We relied on data from professional development feedback surveys, PLC meeting notes, teacher interviews and focus groups, and student assessments.

Professional Development Data Sources and Analysis

To understand how teachers and coaches experienced grant-supported professional learning opportunities, we collected multiple sources of data, summarized in Table 1. First, after the two-day workshop in 2020, all participating teachers (N = 22) completed a survey about their experiences in the workshop, perceptions about equitable instruction in CS, and their concerns about the upcoming school year. In September 2020, the research team conducted two focus groups via Zoom with a sample of teachers who attended the NEXT workshops to gain a deeper understanding of teachers’ experiences and for the coaching team to plan quarterly workshops with teachers’ immediate needs in mind.

To understand how teachers experienced the grant-supported workshops and coaching activities, the research team conducted two sets of semi-structured interviews (Weiss, 1995) with teachers via Zoom. The first set of (“implementation”) interviews aimed to understand teachers’ challenges with remote instruction and perceptions of NEXT workshops and coaching. In Spring
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2021, the research team sent a recruitment email to eligible ECS teachers. However, along with declining participation in the NEXT workshops throughout the 2020-2021 school year, the team received a low response rate from teachers and conducted two implementation interviews in Spring 2021. Due to this low response rate and the continuation of coaching into the 2021-2022 school year, the research team conducted an additional set of interviews in Spring 2022. This second set of interviews allowed the research team to include more teacher perspectives and learn more about ECS teachers’ experiences with professional development during COVID-19.

The team sent a recruitment email to eligible ECS teachers (those who participated in NEXT workshops and/or instructional coaching) and conducted Zoom interviews with seven teachers throughout the spring and summer of 2022. These “retrospective” interviews focused on participants’ CS teaching background, general perceptions of professional growth, initial and current teaching challenges, and their experiences with the NEXT series and other professional learning opportunities.

Finally, the coaching team took notes at each of their bi-weekly PLC meetings during the 2020–2021 school year. These notes documented how the two coaches and two facilitators understood and responded to teachers’ needs during the 2020–2021 school year and how they planned the quarterly NEXT workshops. Table 2 provides an overview of each type of data source and the number of sources analyzed.

**Table 2**

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<th>Professional Development Data</th>
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<td>Teacher Focus Groups</td>
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<td>Implementation Interviews</td>
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<td>Retrospective Interviews</td>
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<td>PLC Meeting Notes</td>
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Table 3 provides information about teachers who participated in focus groups and/or individual interviews.

**Table 3**

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*Note: Participant 937 participated in two interviews (retrospective and implementation).*

**Analysis**

Given the various types of data collected on professional development throughout 2020–2022, the research team first organized all data sources chronologically and by type. This strategy allowed researchers to focus on the overall substance of teachers’ and coaches’ perspectives while also contextualizing what grant-funded activities they had participated in at the time of the data collection. For example, researchers could 1) analyze data at one specific time point, such as teacher survey data from one workshop and the subsequent coaching PLC meeting, to understand how the coaching team interpreted and responded to teachers’ feedback; and, 2) analyze all PLC meetings for common themes that emerged about the challenges and opportunities of remote instructional coaching in general.
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To examine teachers’ and coaches’ overall experiences with professional learning throughout the pandemic school year, researchers compiled all teacher interview and focus group data into a single project in Dedoose and applied structured codes (Saldaña, 2013) aligned to the project’s research questions (see Appendix A). Researchers then used inductive coding (Miles et al., 2014) to explore emergent themes in the data.

Results

In this section, we describe the impact of RAPID grant-supported professional learning opportunities on instructional coaching, teaching, and learning in CPS during the pandemic. First, we show how instructional coaches prioritized supporting teachers both instructionally and emotionally, and how these efforts were experienced by teachers.

Coaching during Crisis: How Coaches Adapted to Teachers’ Needs During Covid

Overall, the PLC meeting notes illuminated how the coaching team navigated dual priorities of addressing teachers’ instructional and emotional needs. Each meeting ended with the coaching team revisiting and adding to their list of coaching strategies. By the end of the 2020–2021 school year, the coaching team developed 18 strategies (see Appendix B). While some strategies explicitly focused on instruction, others centered on teachers’ emotional needs. For example, Strategy #12 focused on instruction: Work directly with teachers on three ECS “big strategies” that can and should involve questioning); whereas, Strategy #13 emphasized that instructional support should be paired with empathy: Empathy continues to be instrumental in coaching and PD for teachers. COVID has caused at least two deaths of faculty in the district, and it hits home for many students and teachers; find out where teachers are at any moment and honor that in addition to providing appropriate support on content and strategies).
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*Focusing on (Remote) Instructional Strategies*

Throughout the 2020-2021 school year, the coaching team committed to reinforcing several instructional strategies integral to the ECS framework and supporting teachers in translating these strategies to the remote learning environment. Additionally, the team chose to focus on the use of district-supported Google suite tools rather than providing teachers with a slew of options. When PLC meetings began in September 2020, the team reflected on the two-day summer workshop before planning the first quarterly workshop of the 2020–2021 school year. Despite some teachers’ concerns that the summer workshops did not provide enough support on CS content, the coaching team emphasized that focusing on instructional strategies was crucial to the ECS model.

Teachers’ feedback on the two-day summer workshop in August 2020 was largely positive, with all 22 teachers indicating that they were “satisfied” or “highly satisfied” with the workshop. 95% of participants reported that they agreed or strongly agreed that they had a “greater understanding of inquiry-based strategies as a result of participating in ECS PD.” In open-ended responses, teachers shared that discussing strategies in small groups (in breakout rooms), peer reviewing each other’s lessons, experiencing activities from the “student perspective” in the online environment, and working with new resources as a group were beneficial to their preparation for the 2020–2021 school year. Teachers reported that the summer workshop informed their own approach to teaching remotely by introducing them to “a lot of resources to help facilitate lessons remotely that I will be using this fall” and that “it was good to get concrete examples of how to teach each lesson.” Another teacher reflected on how the workshop helped them realize that “we don't need to change the curriculum, just figure out how to use different tools to carry out the lessons with students.”
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However, some of the survey feedback and teacher focus groups about the summer workshop surfaced a common concern from many teachers about the lack of specific CS content included in the two-day workshop. As one teacher with two years of ECS teaching experience said:

A lot of the PDs focus so much on the inquiry and equity strands that we don’t ever get that third strand… we do need those three strands, but I feel like the PDs a lot of times ignore the CS concept strand because they’re like “oh, well you can Google it”

(Participant 549).

The coaching team was familiar with this common point of teacher feedback. During the October 28, 2021, PLC meeting, the coaching team noted: “There is always tension between teachers always wanting more ‘content’ and not wanting to focus on ECS-philosophy instructional strategies (equity/inquiry).” The team discussed that this critique from teachers could indicate a lack of confidence on their part, in that they feel more confident with their teaching practice overall but less confident teaching specific CS content.

The coaching team remained committed to emphasizing key instructional strategies that support the ECS model and how they can be translated effectively into the remote learning environment. However, the team understood, given teachers’ feedback on the summer workshops, that they needed to change how they framed and presented these strategies to teachers. Planning for upcoming workshops, the coaching team noted that, when introducing an instructional strategy, they would provide teachers with a pre-reading or some other evidence to provide external validation of the importance of the strategy. They also planned to model the instructional strategy during workshops and coaching sessions and follow up the modeling with a discussion about how participants engaged in the strategy as learners. Finally, the team discussed
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using journaling checklists to allow (and scaffold/support) teachers’ reflections on instructional strategies. Throughout the school year, the team remained committed to focusing on key instructional strategies, such as think-pair-share, pair-programming, and questioning, to build teachers’ capacities to elicit meaningful engagement from students.

**Attending to Teachers’ Emotional Needs**

In addition to emphasizing instructional strategies, the coaching team recognized and attempted to address teacher wellbeing. During the winter and spring meetings, PLC meetings increasingly focused on teachers’ and coaches’ emotional needs, especially as CPS began to plan for the return to in-person instruction in 2021. The PLC meeting notes document how the instructional coaches were aware of teachers’ growing anxiety about returning to in-person instruction. For example, the December 2, 2020, meeting notes included this observation from the coaching team:

“There is a noticeable combination of fatigue and worry. CPS leadership is wrestling with the idea of returning to in-person learning after holiday break while simultaneously continuing with remote teaching and learning; there is no perfect solution and it’s taxing for teachers to manage both audiences at once.”

This general observation surfaced throughout PLC meetings in January and February, 2021, with the coaching team noting how teachers appear “very exhausted and stressed” and that “all feels very overwhelming.”

By early January, 2021, CPS began incrementally reopening schools for in-person instruction, a decision met with mixed responses from parents and community members and intense opposition from the Chicago Teachers Union (CTU) (Koumpilova, 2021). High schools were the last to reopen in April, 2021, given the additional challenge of managing crowded
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hallways during transitions (Kunichoff, 2021). Since students were given the option to return to in-person instruction or continue learning remotely, teachers were required to simultaneously deliver instruction in-person and virtually. The coaching team noted these changes during informal observations:

“Teachers and students are back in school to some extent—not a lot of concrete data to report but informal observations by Don and Valerie indicate small numbers of students actually present in school classes (1–5 students, often) and teacher is present and working with in-person and online students at the same time” (PLC meeting notes, April 20, 2021).

The PLC meeting notes show the coaching team’s awareness of how the uncertainty around the district’s return to in-person instruction affected teachers emotionally and the coaches’ commitment to keeping this source of stress in mind when planning for professional development and coaching.

The return to in-person instruction was not the only stressor noticed by the coaching team. The coaching team also discussed the feelings of isolation brought on by the pandemic and the trauma associated with recent incidents of community violence. During the March 25, 2021, meeting, the team noted:

“This has been a dark week for everyone. We have teachers and students who have limited to no connection or interaction, and this is damaging. Not being able to process things is unhealthy. Additionally, two ECS teachers—one local and one national passed away and this has added to layers. To experience another shooting/tragedy just adds to the massive loss (layers of loss) for people this year.”
These observations continued as the team planned the final NEXT workshop for April 28, 2021. The team noted how “this is a very hard time for everyone right now, especially teachers. Being mindful of emotional health is critical.” They acknowledged how these circumstances can impact people “differently and we must be respectful of that.” Looking ahead to the final workshop, the team discussed their priorities of infusing the strategy of pair-programming into the workshop but also keeping teacher wellbeing front of mind. PLC notes in the spring included this discussion point about the coaching team: “If we can do something constructive and at the same time emphasize that survival is the number one goal… What are some ways we can help each other with this and acknowledge that perfection is not the goal?” In sum, while the coaching team worked to build teachers’ capacities to implement key instructional strategies in the remote and/or in-person CS classroom, they remained acutely aware of and strove to address teachers’ emotional needs during the 2020–2021 school year.

**Challenges and Looking Ahead**

The coaching team experienced several challenges not directly related to the pandemic or transition to in-person instruction. First, the coaching team was concerned about not reaching enough teachers through the NEXT series, as workshop attendance dropped significantly throughout the year – from 22 teachers in August, 2020, to 6 teachers at the final workshop in April, 2021. Since teacher feedback on post-workshop surveys was generally positive, it is possible that teachers’ declining attendance indicated something other than not finding the workshops helpful to their practice. One teacher explained:

“We just get so overwhelmed, you know, as teachers. And we’re so overworked that, as the year goes on… we just have so much going on, and so much to do constantly. And so, it’s you know, it’s like nice during summer, you meet some people, you talk to them. But
when the school year really gets going, you know it’s just a couple emails here and there, and then optional sessions that I don’t even really feel like I have the time for.”

(Participant 969).

This teacher did not attend any NEXT workshops and provides one possible reason why those who attended the NEXT workshops in the summer and fall dropped out later in the school year.

Don and Valerie also expressed concerns over the future of their positions, given that instructional coaching positions are never guaranteed from year to year in CPS. However, by the end of the school year, the team learned that coaching positions would be renewed for the following school year and would be funded out of local and/or grant funds. Don and Valerie reported on a positive meeting with district leadership, where leaders acknowledged the importance of, and stability provided by, CS instructional coaches. Additionally, Don and Valerie shared that they were working with other districts around setting up instructional coaching programs.

In the last few PLC meetings of the 2020–2021 school year, the coaching team discussed the importance of flexibility and reflection: “things can and will always shift. It’s critical to stay committed to central goals and keep moving forward based on lessons learned.” While the coaching team planned to use feedback from this year to plan for the following year, they also acknowledged that the return to fully in-person instruction in the 2021–2022 school year meant that teachers’ needs might shift again. The team discussed making sure that they would address teachers’ current needs and provide in-person professional development and coaching as much as possible. Finally, the instructional coaches discussed doing learning walks with ECS teachers who facilitate PLCs and hoping that these teachers would take more of a lead with professional development in the future.
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Overall, the coaching team’s PLC notes indicate a strong commitment to supporting teachers’ instruction, acknowledging the stress and uncertainty brought on by the pandemic, and attending to teachers’ wellbeing and emotional needs.

Teachers’ Experiences of RAPID Grant-Supported Professional Learning Opportunities

Throughout the school year, teacher feedback on post-workshop surveys was generally positive, with all teachers indicating that they were “satisfied” or “highly satisfied” with each session. Teachers’ responses on the open-ended feedback portion of the surveys showed that many teachers valued that the workshop reengaged them with several key instructional strategies and provided them with a sense of community. For example, one open-ended survey response said, “I think the greatest value of these workshops has been to help me not forget what’s important [and] that my fellow teachers are a huge resource for creative ideas.” Interviews and focus groups allowed teachers to elaborate on their experiences in coaching and NEXT workshops and reflect on their professional growth in teaching CS. Our analysis of teacher focus groups and interviews showed that teachers experienced the NEXT workshops and coaching sessions as the coaching team intended: teachers expressed learning key instructional strategies, feeling supported by the instructional coaches, and gaining a sense of community among other CS teachers.

Grant-Supported Professional Learning Opportunities Helped Teachers Implement Key Instructional Strategies

Teachers commonly remarked that coaching and NEXT workshops provided them with concrete suggestions for planning and implementing key ECS instructional strategies. During the third NEXT workshop (March 3, 2021), teachers reported how they integrated instructional strategies from the NEXT workshops into their classes. Such strategies included pairing students
in breakout rooms; using “whip arounds” (i.e., having every student share a reflection or takeaway) to encourage more equitable participation; using the Jamboard; and, intentionally reflecting on lessons at the end of each week to make modifications.

These concrete takeaways were also evident in teacher interviews and focus groups. Six teachers articulated that professional learning opportunities helped them learn, revisit, and implement key instructional strategies. For example, some teachers appreciated that they not only learned about helpful resources but were also given guidance about how to use those resources, rather than receiving “a bunch of resources” to digest on their own.

Teachers also expressed benefitting from experiencing sample lessons as students. As one teacher explained:

“Don and Valerie would be like, ‘Okay. Put your, like, student hats on and we’re going to do this.’ And then we would all, like, do the lesson together from the student perspective. That kind of thing helped you, like, figure out, okay, I'm going to probably run into this problem, how am I going to deal with it in the classroom?” (937).

While NEXT workshops focused on several key instructional strategies, small-group and one-on-one coaching allowed for personalized support. One teacher explained how she improved her practice by working one-on-one with Valerie:

“I had a really, really hard time implementing group work in my classrooms, and so it was actually through guidance mainly from her. Like, she was, like, okay, explain what you have, like, what you have in your classroom. Give me like, a layout. She even came to visit. So it was like with her guidance, I was able to implement some of the strategies that we talked about. Some of the strategies didn’t work out so well. So we tried new ones. So it was all about the suggestions she gave me, the ideas” (3046).
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These responses – receiving targeted support on planning and implementing instructional strategies and individualized support from coaches – were common among teachers in interviews, focus groups, and NEXT workshop feedback surveys.

Professional Learning Opportunities Provided Teachers with a Sense of Community and Emotional Support

In addition to receiving targeted instructional support, four teachers discussed gaining a sense of community with fellow CS teachers and coaches throughout the workshops and/or coaching sessions. Coaches paired such teachers together and encouraged them to check-in with one other throughout the year. As one teacher explained:

“..."I meet with my partner every other week... And we speak to the challenges, barriers. And to me, it’s just an opportunity to have that sense of community because I don’t have – I’m the only person in my department. And so there’s nobody else I could speak to about ECS or nobody that could understand the concepts. And so knowing that I see her every other week or we have our check-ins with the big group, it just gives me another reassurance that other people are doing what I'm doing. And I’m always writing notes of, like, takeaways. And so it’s still having that sense of community because we still have not solidified it as a city, Chicago, of, like, computer science, what that looks like” (216).

As this teacher explains, a sense of community was particularly important for teachers who were the only CS teachers in their buildings.

Teachers Felt Emotionally Supported by Coaches

Consistent with the coaching team’s attention to teachers’ feelings of stress and uncertainty, instructional coaching provided teachers with emotional support throughout the
school year. Three teachers emphasized developing strong relationships with their coaches and receiving emotional support during coaching sessions. As one teacher explained:

“I’ve come into it stressed, like it’s been a hard week, I’m not sure what I am going to do. And they would always just kind of very professional, supportive. They would deflate any tension. And they, on more than one occasion, made, like, trips out to [my school] to plan with me… it made me feel like, okay, they are there for me beyond just like a transactional ‘I'm your coach.’ Like, they developed a lot of relationships” (14431).

This teacher’s perception of his coach being there beyond a “transactional” relationship shows how the coaching team’s extensive discussions about teachers’ emotional needs and efforts to lead with empathy were evident to teachers.

**Opportunities for Professional Growth and Reflection**

Finally, two teachers described the benefit of coaching as providing ongoing and non-evaluative opportunities for growth and reflection. As one teacher explained, being observed by instructional coaches was more motivating than being observed by her building administrators. She explained that instructional coaching

“makes me just want to continue learning and growing. Because I got observed, and it wasn't [inaudible] like an administrator does… It really encourages me to keep on reflecting and to keep on wanting to do better, to get better… You can reach out to them at any time, and they’re there to provide support. And they will, and they do respond. And they respond very quickly, more quickly, or at a reasonable timeframe. Again, like something that I have not had before. So I’m very appreciative of what I am getting through them.” (878)
This teacher’s experience highlights the importance of non-evaluative instructional coaching to improve teachers’ practice and that some teachers do not have access to feedback or content-specific professional development in their schools.

Unmet Professional Development Needs

Though teachers held generally positive views of NEXT workshops and coaching, some maintained their critiques that ECS professional learning opportunities do not offer enough CS content. Relatedly, three teachers mentioned that they hoped future district-run professional development would better meet the needs of experienced teachers ready to take the next steps in their computer science teaching and to motivate newer teachers to get to this point. They hoped that future PDs could offer support for teachers who are ready for more than introductory support and want to teach AP CSP, and that workshops could provide opportunities for teachers and facilitators to work through more advanced materials together as an experienced group. As one teacher articulated, designing PDs for teachers who are ready to move forward with more advanced content could: “help build the confidence of those teachers to say that I want to do more than just ECS.” He continued:

“I think that we really still haven’t defined like what is a transition to AP CSP. And a lot of teachers are not going to – if I’m coming from English, to think that I’m going to take a class after ECS is really hard for them to conceptualize because they really haven't gotten a chance to really get into that content and understand the ebb and flow to say I can visualize me going on to the next curriculum. But I don’t think we foster that quite enough to get them excited about doing it” (518).

ECS was designed for students with no prior CS experience and does not explicitly attempt to prepare students for more advanced CS courses. Unsurprisingly, then, the coaching team did not
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discuss developing teachers’ capacities to deliver more advanced CS courses during PLC meetings. However, this sentiment from an ECS teacher was shared by several others – that some ECS teachers are interested in attending PD that deepens their CS content knowledge and prepares them to teach more advanced CS courses.

Discussion

This report summarized a RAPID grant-funded project designed to mitigate the effects of pandemic-related school closures and shift to online instruction on CPS high school students’ access to equitable CS education. We found that the instructional coaching team designed effective professional development workshops and coaching structures around key instructional strategies and made efforts to address teachers’ emotional needs throughout the school year. Teachers reported that focusing on key instructional strategies helped (re)ground them in the ECS framework and build community with and among students in the remote environment. Teachers also expressed feeling emotionally supported by their coaches and gaining a sense of community with other CS teachers throughout workshops and group coaching models.

These findings make the following contributions to research on professional development, instructional coaching, and teaching and learning during the COVID-19 pandemic. Consistent with Desimone and Garet’s (2015) framework for effective professional development, the NEXT Workshops were focused on key CS instructional strategies that help students access CS content, helped teachers respond to local conditions by adapting CS instructional strategies to the remote or hybrid learning environments, promoted community and collaboration among CS teachers, and were sustained throughout the school year. Like Desimone and Garet (2015), recent frameworks for effective professional development (e.g., Darling-Hammond et al., 2017; McGee & Nutakki, 2017; Short & Hirsh, 2020) center content, engagement, duration, and collaboration.
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However, these frameworks were published prior to COVID-19 and may not account for the specific instructional, emotional, and other challenges brought on by the pandemic and remote instruction. Our findings, then, add to the literature on effective professional development by showing what professional development structures and practices best support teachers in times of crisis. Specifically, this research points to the need to account for the humanistic side of professional development, as both teachers and instructional coaches discussed the importance of providing and receiving emotional – in addition to instruction – support.

Data collected by CAFÉCS provides important documentation of how CS teachers and instructional coaches experienced their work during the COVID-19 pandemic, contributing to emerging research on the challenges and benefits of instructional coaching in the context of COVID-19 (Brown et al., 2021; Giffin, 2020; Jackson & Keirstead, 2020). Recent evidence suggests that teachers experienced increased stress, feelings of burnout, and intentions to leave the profession (Diliberti et al., 2021; Gicheva, 2021; Pressley, 2021; Steiner & Woo, 2021) but that positive working conditions and feeling a “sense of success” with students helped sustain their commitment to teaching (Kraft et al., 2021). Our findings provide additional insight into how professional development and instructional coaching structures, particularly those designed to support teachers both instructionally and emotionally, are key aspects of teachers’ working conditions that could improve their practice and commitment to teaching during challenging circumstances.

Relatedly, this report builds on several recent studies of CS education during COVID-19, which explored how practitioners perceived the pandemic’s impact on CS education for students from higher and lower-income backgrounds (McGill et al., 2022) and the impact of “emergency remote teaching” on the CS education community in the United Kingdom (Crick et al., 2020,
IMPACT OF REMOTE PROFESSIONAL LEARNING DURING COVID-19 2021). CPS provides a unique context to study the impact of COVID-19 on CS teaching and learning, given that the subject is now a graduation requirement, and because the district was working to rapidly expand students’ access to CS when the pandemic hit. Moreover, the longitudinal, iterative, and variety of data collected provides unique insights into how instructional coaches made real-time adjustments in response to rapidly changing circumstances and attempted to meet teachers’ emotional and instructional needs. Future research should include interviews at multiple time points, analysis of recurring meeting notes, daily diaries, or experience sampling surveys (Csikszentmihalyi & Larson, 2014) that capture how practitioners make real-time adjustments to their practice based on feedback and new circumstances.

Implications for Policy and Practice

This research also has several implications for practice and policy related to CS education. As school districts continue to experience the effects of the pandemic on student learning and teacher motivation, professional development and instructional coaching are crucial to ensure students’ access to high-quality and equitable CS education. Based on our research, we offer the following implications for practice and policy:

1) Professional development should be designed to address teachers’ different professional needs.

Though teachers’ responses to workshop surveys, interviews, and focus groups surfaced several common themes, these data also showed how teachers’ professional backgrounds and needs varied significantly. Since CS became a high school graduation requirement, many teachers without CS backgrounds became CS teachers. While RAPID professional development and instructional coaching attempted to (re)ground teachers in key instructional strategies that should support all students’ learning in CS, some teachers were frustrated by a lack of
opportunities to deepen their expertise in CS and/or learn areas of CS. Teacher turnover in CPS, the popularity of the ECS course, and continued need for CS teachers means that there will always be a need for introductory CS teacher training. However, our findings suggest that some experienced ECS teachers seek opportunities to expand their knowledge of CS content and teach more advanced CS courses. Thus, we recommend that the district provide or connect experienced ECS teachers with opportunities for continual professional development around CS content, particularly for those without CS backgrounds.

2) Districts should invest in developing and supporting instructional coaches.

Teacher interviews and focus groups revealed how teachers benefitted from working with the instructional coaches one-on-one or in small group settings. Further, the PLC notes – and teachers’ descriptions of the support they received from coaches – showed that the coaches were aware of and able to quickly adapt to meet teachers’ needs and benefited from reflecting on their own practices as coaches. By the end of the school year, the coaching team developed 18 different strategies that captured their learnings throughout the year. Given prior research on the benefits of instructional coaching and teachers’ positive experiences with instructional coaching during the 2020-2021 school year, CPS and other districts should invest in instructional coaches for every subject and provide opportunities for coaches to grow and reflect on their practice.

3) Instructional coaches and professional development providers should prioritize teachers’ emotional needs.

The various coaching models designed and implemented by CAFÉCS, and teachers’ perceptions of instructional coaching, show that professional development can be designed to attend to teachers’ emotional and instructional needs. Reports of teachers’ increased stress, burnout, and intentions to leave teaching (Diliberti et al., 2021; Diliberti & Schwartz, 2021;
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Pressley, 2021) strongly suggest the need for school leaders, instructional coaches, and professional development providers to focus on teacher wellbeing and commitment in addition to supporting instructional improvement. Given the coaching team’s efforts to attend to teachers’ emotional needs were felt by teachers, the CAFÉCS coaching models could be useful in disciplines other than CS.

Conclusion

This report summarized the design and outcomes of CS professional development workshops and coaching models, supported by an NSF RAPID Collaborative Research Grant, and implemented by CAFÉCS. To understand the impact of these professional learning opportunities on instructional coaching and teaching in the remote context, we analyzed several sources of qualitative data, including PLC meeting notes, teacher interviews and focus groups, and teacher feedback surveys. We found that the instructional coaching team designed professional development workshops and coaching structures around key instructional strategies and made efforts to address teachers’ emotional needs. Teachers reported that focusing on key instructional strategies helped (re)ground them in the ECS framework and build community with and among students in the remote environment. Teachers also expressed feeling emotionally supported by their coaches and gaining a sense of community with other CS teachers throughout workshops and group coaching models. While more research is needed to understand the full effect of remote instruction on CS instructional coaching, teaching, and learning, our findings highlight the importance of devising instructional coaching and professional development models that are responsive to teachers’ different needs and allowing instructional coaches to continually reflect on their own practice.
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Appendix A

Interview and Focus Group Codebook

1. **Impact of NEXT workshops on professional growth**: Includes participants’ descriptions of how NEXT workshops impacted (or not) their professional growth

2. **Impact of coaching on professional growth**: Includes participants’ descriptions of how coaching (in SY21 or SY22) impacted their professional growth

3. **Impact of other professional learning experiences on professional growth**: includes participants’ discussions of how other professional learning experiences (e.g., college or master’s-level courses; external PD) impacted their professional growth that teachers believe have supported their growth (not NEXT workshops or coaching)

4. **Professional growth since beginning of CS teaching**: Includes participants’ descriptions of how they have grown professional since they began teaching computer science

5. **Initial challenges**: Includes participants’ descriptions of challenges that they recall facing when they first started teaching computer science

6. **Current challenges**: Includes participants’ descriptions of challenges they are facing currently while teaching computer science

7. **Unmet professional learning needs from RAPID workshops/coaching**: includes participants’ discussions of what the NEXT workshops or coaching did not include that they would have liked to experience during workshops or coaching sessions

   a. *must refer specifically to what NEXT/coaching did not offer, not general hopes for PD (use code below for that)*
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Unmet professional learning needs (in general): includes participants’ discussions of additional hopes/needs from professional development in general, not specific to NEXT/coaching (i.e., in response to: “what else might the district have done to support you better?”)
Coaching Strategies Developed During Coaching PLC in 2020–2021

1. Build trust and community as top priority to obtain commitment to PD this year
2. Focus on listening/needs-sensing and collaboratively designing PD for teachers since we are amid many “unknowns” related to teaching environments, schedules, etc.
3. Keep “eye on the prize” which is identifying ways to ensure the experienced ECS teachers fully understand and practice inquiry and equity-based strategies in their classrooms
4. Regularly organize/prioritize different coaching levels/groups based on visible needs (e.g., general pool of ECS teachers for coaching, PLC, Teachers’ Lounge, Coaching Café).
5. When instructing an instructional strategy, provide *evidence* such as a pre-reading during the PD to emphasize our focus on this instructional strategy, provide validation of the strategy, and gain teacher buy-in to the strategy
6. Model techniques (strategies) during coaching/PD, for example to elicit volunteers to talk (could do color-coding, counting off, or popsicle stick).
   a. Model Think/Pair/Share as an instructional strategy during the PD and follow up with a group discussion about the process they engaged in “as learners” and what benefits they see for this type of strategy used with their students.
7. Use Journaling checklists to allow (and scaffold/support) teachers’ reflections on instructional strategies
8. Establish NORMS (expectations) for participating in breakout rooms/group activities
9. Have a concrete goal for the teachers that requires they do something between now and the next PD (accountability, productivity, engagement for students)
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10. To engage at the start of class/session: set it up, build, make connections between parts

11. Student Care starts with Teacher Care. Weave elements from PLC PD Day into Coaching.

12. Work directly with teachers on three ECS “big strategies” that can and should involve questioning; specifically, how can these strategies be made better by good questioning? (Pair Programming; Think, Pair, Share; Gallery Walk)

13. Empathy continues to be instrumental in coaching and PD for teachers. COVID has caused at least two deaths of faculty in the district, and it hits home for many students and teachers; find out where teachers are in any moment and honor that in addition to providing appropriate support on content and strategies.

14. It is critical to not to focus on pushing through activities more than paying attention to making time for rich student conversation; this is where questioning skills come into play.

15. The choice of technical tool should be driven by the instructional goal, i.e., choose the Right Tool for the Right PURPOSE. Lead with pedagogy and selecting the tool that supports those goals.

16. LESS is MORE. We need to keep focused on the one central goal of a PD session, e.g., authentic questioning strategies to draw out student engagement, and let that one goal drive the activities. With that, the activities need to be limited in scope to ALLOW time for modeling of effective questioning and elicitation of response/engagement.

17. It is critical to highlight the work of teachers to provide support and recognition for their efforts – this also builds community and respect among the larger group of ECS instructors and provides models for new ECS teachers. One strategy for accomplishing this is to FEATURE ECS teachers and facilitators in monthly OCS newsletters.
18. The importance of self-care for coaches is critical. In addition, operating with the mindset of flexibility and adapting to changing circumstances.