



One-on-One Coaching to Support Connection Making: Moving Professional Learning to Practice

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Abstract: In this paper, we explore how one-on-one coaching supported one teacher in implementing ideas about computational thinking in her classroom. We draw from existing literature on coaching strategies but recognize those tend to have been developed in large-group or small-group settings rather than one-on-one. Our findings consider two kinds of questions that seemed to support the teacher in engaging with discourse practices that have been shown effective for coaching (Lefstein et al, 2020). Our findings suggest that coaching made the instruction and activity from PL workshops more relevant and tangible for the teacher.

Purpose

While researchers have done considerable work determining the characteristics of high-quality professional learning (PL; e.g., Desimone, 2009; Loucks-Horsley et al., 2010; Penuel et al., 2007), supporting teachers in translating ideas from PL into practice often remains elusive. Thus, we have been working on the development of a Model of Coherent Learning for Teaching (Orrill & Brown, 2023) that explicitly considers how to move high quality PL into practice. In the present project, we have developed an ongoing PL program, designed with the high-quality PL characteristics in mind. A group of elementary teachers met monthly, typically face-to-face, with a goal of integrating computational thinking (CT; e.g., Wing, 2006) into their regular math and science classrooms. To help support the teachers move the instruction from the workshop to implementation in the classroom, the professional developer engaged teachers in one-on-one coaching each month. In this paper, we consider coaching as a Connecting experience that supported teachers to move from their work as learners in the PL to teachers in their classrooms. Further, this study addresses the need for more evidence about the potential elements of effective coaching models (e.g., Desimone & Pak, 2017) for shaping practice. To this end, we present the case of one participant (Lisa) and considered: How might one-on-one coaching support a teacher to Connect her learning of computational thinking to her application of it in the classroom? What strategies are used in the one-on-one coaching seemed effective for the teacher to Connect the PL to her classroom practice? How do these strategies help a teacher move from learning about CT to teaching CT in her classroom?

Perspective and background

We situate this work in the Model of Coherent Learning for Teaching (MCLT; Orrill & Brown, 2023) which organizes PL in three phases: Exploring, Connecting, and Applying. MCLT asserts the need for a stage between Exploring the content (in this case, computational thinking) and Applying it in the classroom. We have found in MCLT mathematics work that teachers struggle to integrate new-to-them ideas into their teaching. Thus, the need for Connecting activities. We see one-on-one coaching as one possible approach for supporting the work of translating the experience as a learner into the experience as a teacher.

To understand the coaching moves that seemed important for connection-making, we used the lens developed by Lefstein et al (2020). In their systematic review, they considered 64 articles researching teacher team discourse and interactions. Their goal was to identify norms and structures of collaborative discourse in coaching that can generate teacher learning. The authors identified five discourse practices that had potential to generate teacher learning. These were a) revealing and probing problems of practice, b) providing evidence or reasoning, c) making connections to general principles, d) building on others' ideas, and e) offering different perspectives. This lens allowed us insight into how one-on-one coaching might be fostering the Connections we assert to be valuable for supporting teachers.

Methods

For this study, we used an exploratory qualitative approach. We did this because while we recognized that something interesting and important was happening in the coaching, we wanted to try to understand it. Using the Lefstein et al. (2020) framework allowed us a lens for categorizing the coaching moves we saw.



Participant

The work reported here considers one teacher's work in an ongoing PL experience that included monthly, virtual coaching sessions, and observation of implementation in the classroom. The teacher, Lisa (pseudonym), was a 10-year veteran who served as her elementary school's STEM coach. Lisa joined our PL in Year 1. The PL was initially aimed at supporting the integration of CT into STEM, however, as the needs of the teachers emerged during the year (which was the first post-COVID year), the focus broadened to include more than just STEM. The teachers felt that they could not use CT effectively in content courses because of time constraints but felt confident using it elsewhere in their curriculum. We chose to focus on Lisa because she seemed eager and engaged in trying to use CT. We also found it interesting that even though she was a STEM coach for her school, she did not initially use CT and the robot in her regular content courses. Instead, she used time she had each morning with students that was for social-emotional learning.

Data sources

The PL sessions occurred monthly, typically face-to-face, for 105 minutes each session. The content of the PL focused on using Photon robots, implementing problem-based learning, and implementing design thinking. Before we began the PL, participants completed a series of 11 two-hour online modules, including seven focused on using the Photon robots. The work reported here occurred from January 2022 (when the coaching began) to June 2022 (when year 1 data collection ended). The facilitator worked for a professional development company that was leading the design and implementation of the PL while the research team focused on data collection. Each PL session was videorecorded. Typically, one camera was trained on each group of teachers as they worked.

The coaching sessions were conducted virtually on Zoom between the PL sessions. Teachers were invited to meet with the facilitator either one-on-one or in small groups (their choice). Each session lasted about 20 minutes and was recorded in Zoom. For this analysis, we used the videos from three coaching sessions. We analyzed each coaching session in which Lisa and the facilitator discussed the series of lessons Lisa implemented related to helping the 5th grade students get ready to move to 6th grade where they would need to make new friends. To help them make that transition, Lisa chose to focus on what restaurants they like, saying it was a way to greet new people. The task she ended up developing out of this work was implemented across several days and involved the students teaching the Photon robot about restaurants they did or did not like. For each restaurant, the robot had to navigate near each restaurant laid out in a pattern on the floor and make a noise indicating whether the student did or did not like that restaurant.

The classroom observation was completed during a one-week unit, developed by Lisa, focused on using Photon robots for Social-Emotional Learning. Each morning, for five days, she invited us to observe her lessons. Each lasted 20 to 60 minutes, and we observed the second round of implementation of the unit Lisa developed (e.g., she had taught the same set of lessons to a different class the previous week).

Analysis

Using Lefstein and colleagues' (2020) discourse practices to help us identify potentially important interactions between Lisa and the facilitator, we analyzed each of the coaching transcripts to identify patterns in their discussion. We also used the PL and implementation videos to situate our understanding of the experiences Lisa had been exposed to as well as the way she implemented her own lesson.

Results

Potentially productive one-on-one coaching activities

In considering the case of Lisa, we analyzed one video from PL, three coaching sessions, and one classroom implementation video to start our exploration of how coaching may be supporting her Connecting (Orrill & Brown, 2023) her PL experience to her teaching. These data were selected because the unit Lisa developed for her classroom was closely related to a PL experience in which she had participated. Thus, the data provided a holistic experience to explore our research question about how to engage teachers in the Connecting stage of the MCLT's Exploring-Connecting-Appling model. Our analysis revealed two families of questions used by the facilitator that seemed salient for supporting Lisa's Connecting work. Below, we first characterize important kinds of discussions we observed between the facilitator and Lisa. We then discuss our emerging framework explaining how and why these activities seemed to have supported Lisa in creating and implementing her lessons.

Envisioning and reflecting

One type of questioning that seemed impactful for moving Lisa from Exploring in the PL to Applying in the classroom involved the facilitator asking Lisa how she envisioned the lesson in action. After Lisa described her

idea of creating a Photon unit on collaboration and communication, the facilitator asked questions such as “how are you thinking of approaching that?” and “how do you envision your students collaborating as they navigate the activity in the classroom?” These questions led Lisa to think about the specific logistics of the lesson, such as the timing, her exact starting activity, and student moves during the lessons. These conversations were different than those that occurred in PL sessions because they were specific to Lisa’s idea and her teaching context. They allowed her to focus what she had learned in the PL to her teaching.

Along with conversations about envisioning the future, there were also instances when both Lisa and the facilitator reflected on past experiences. For example, in thinking about specific activities for her lessons, Lisa recalled a maze activity from a previous PL session, which she incorporated into a lesson. She also recalled watching a video of a teacher using foam pads to help make mazes on the floor. These reflections seemed to help Lisa move forward in the actual creation of the lessons.

The acts of envisioning and reflecting cross several of Lefstein et al.’s (2020) categories. These questions helped Lisa anticipate problems of practice, build from prior experience, and provide reasoning for the choices being made. Thus, envisioning and reflecting served as Connecting activities in that they served as a tangible means of reflecting on her learning about Photons to thinking about what that will look like in practice.

Connections to general principles

During the coaching sessions, the facilitator explicitly connected the specifics of Lisa’s lesson to general principles and concepts of CT from the PL sessions. For example, after Lisa mentioned she wanted her students to program Photon to drive through a maze, the facilitator said:

They [students] want the steps put in place, so that could be something you [Lisa] talk to them about it and kind of infuse that in the lesson. You can name it for what it is. This is algorithmic thinking.

Algorithmic thinking is a CT concept that was discussed during the PL sessions. The facilitator explicitly connected the activity to the specific CT skills and encouraged Lisa to use that vocabulary with her students. This way of helping Lisa extend her knowledge is related to Lefstein et al.’s (2020) categories in that they supported Lisa in making connections between the actions she is trying to plan and the principles of CT that we want her to learn. This served as an important Connecting activity by providing a means for the “more knowledgeable other” to reinforce key ideas from the PL as it is being taken into practice.

Refining the framework

To answer our third research question, we revisited the MCLT framework. Our preliminary conjecture about the MCLT activities that supported Lisa is shown in Table 1. The PL workshops provided Exploring activities. Lisa engaged in CT-related activities as a learner by programming robots and doing offline programming. She had opportunities to develop pedagogies like problem-based learning, design thinking, and computational thinking. She had time to think about how to implement these practices into her classroom in the PL. Implementation in the classroom was the intended Application. The Connection phase was critical as it served as one-on-one support Lisa needed to adapt the learning experience to her teaching, as illustrated above. Reflecting, envisioning, and connecting to CT principles seemed particularly important for Connecting. We assert that this PL model – which pairs learning with and about the technologies and pedagogies with scaffolded planning and encouraging implementation – has the potential to support teachers in implementing ideas from PL. As shown in Table 1, coaching fostered dialogue making the ideas from PL more tangible as ideas that can be used in the classroom.

Table 1
MCLT Applied to Lisa’s Case in CT Counts

PL Activity	Exploring PL	Connecting Coaching	Applying Classroom implementation
Teacher Activity	Hands on programming In-workshop projects Planning time	Envision Reflect Connect to CT principles	Plan for teaching Teaching

Based on this analysis, we assert that engaging in one-on-one coaching has unique affordances unavailable in other settings. Coaching conversations were focused on specific sensemaking related to the PL and the way the teacher was going to apply their own sensemaking experience to their teaching. Thus, it allowed doing CT and learning about CT to become tangible for the teacher. Post-COVID, teachers have access to and facility



with video technologies that made virtual coaching sessions feasible in ways previously unavailable. In these sessions, the facilitator asked questions that constantly connected the teacher's professional knowledge from experience to the new knowledge being developed in PL. Consistent with our ongoing work in mathematics (e.g., Orrill & Brown, 2023), the work in CT suggests that a phase between PL and application is critical for moving from professional development to individual teachers' practice.

Scholarly significance

This study expands our understanding of the MCLT approach beyond mathematics. It also considers coaching through a one-on-one model, which has not been well-reported for CT learning. Prior coaching research has focused on supporting content, pedagogical, instructional and tool knowledge in PL (e.g., Horn et al., 2015; Polly, 2012; Saclarides & Harbour, 2020). Further, studies have analyzed teachers' learning opportunities (e.g., Horn & Kane, 2015; Levine & Marcus, 2010) and changes in practice (e.g., Polly, 2012). Little has focused on one-on-one models that pair coaching with PL to impact practice. Clearly, more work needs to be done to better understand how coaching helps teachers move from PL to practice, but interrogating Lisa's experience offers insights into the mechanisms that may help us better understand the role of one-on-one coaching in this setting.

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