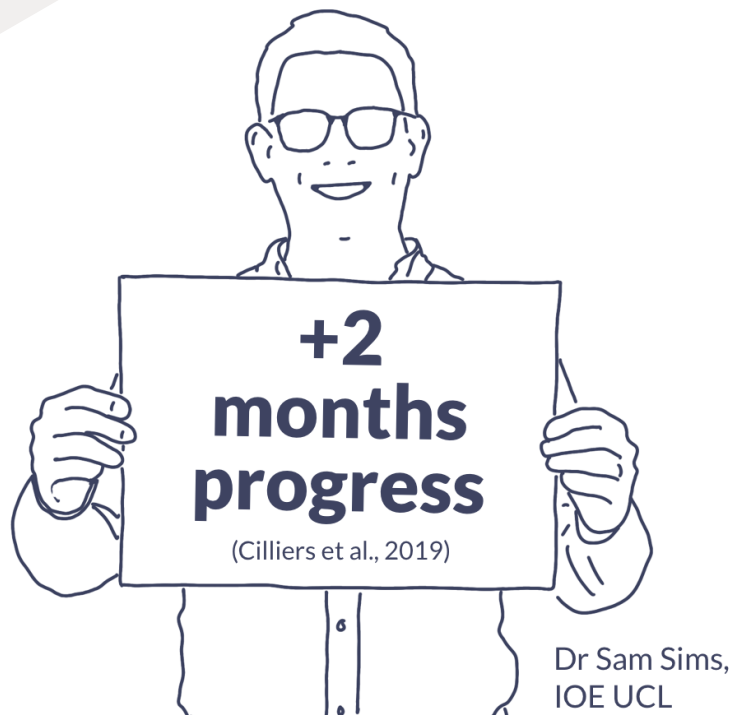


White Paper

THE EVIDENCE & RATIONALE BEHIND

STEPLAB

By Arielle Boguslav* & Josh Goodrich



Abstract

Steplab is a platform designed to support schools to deliver effective Professional Development (PD) to teachers, using Instructional Coaching (IC). In this paper, we outline the theoretical and research basis for the Steplab approach to IC. We summarise the challenges of developing a theory of teacher learning: that such a theory necessarily encompasses research from a variety of academic disciplines which lacks consensus around what it means to learn as a teacher, how to bring about teacher learning or what teachers should learn about. We propose a conception of teacher learning that overcomes this issue, outlining what we think the overall aims of PD are, and what the research suggests are the best ways of ensuring teacher learning. We outline an approach to IC that supports teachers to develop technical skill, judgement and move towards adaptive expertise, and discuss how Steplab supports schools to implement IC at scale. Finally, we detail how this happens in practice on the Steplab platform.

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Suggested citation: Boguslav, A. & Goodrich, J. (2022). *The Evidence and Rationale Behind Steplab* [v1.3].

Available online at steplab.co/white-paper

Introduction

Great teachers change students' lives. Just having a single great primary school teacher can increase students' lifetime earnings by \$320,000 (Chetty et al., 2010). Great teachers increase academic achievement, increase university attendance, and decrease teenage pregnancy, among many other outcomes (Chetty et al., 2014; Rivkin et al., 2005). Yet, often the most disadvantaged students are assigned to the least effective teachers (Akiba et al., 2007; Allen et al., 2018; Clotfelter et al., 2005; Dolton & Newson, 2003; Grissom, 2011; Ost, 2014; Rivkin et al., 2005).

Efforts to recruit and retain great teachers are not enough to ensure that all students have access to great teaching (Johnson, 2006). In fact, it is not at all clear how we can reliably identify 'great teachers' before, or even after, they enter the classroom (Bartanen & Kwok, 2021; Cohen & Goldhaber, 2016; Corcoran & O'Flaherty, 2018; James & Loeb, 2021). Should teacher quality be measured based only on student outcomes? How can we ensure that the student outcomes we measure capture the many ways we hope teachers will influence their students? Should we instead rely on lead teachers or other observers to judge the quality of teachers' instruction? Perhaps more importantly, research using multiple measures of teacher quality suggests that many teachers slowly accumulate expertise over time (Atteberry et al., 2015; Kraft et al., 2020; Papay & Laski, 2018).

Together, these challenges highlight the importance of efforts to support teachers with improving their instruction through Professional Development (PD) programming (Hill et al., 2021). Indeed, research suggests that high quality PD programs have the potential to accelerate teachers' development of expertise and are important for facilitating the translation of new research into practice (Didion et al., 2020; Kraft et al., 2018; Lynch et al., 2019; Pellegrini et al., 2021).

Steplab is committed to supporting schools with providing high quality PD for their teachers. While there is reasonable agreement that the ultimate goal of PD is to support student learning and well-being, there is less consensus about what mechanisms and goals for teacher development will lead to long-term improvements in student outcomes (Boylan & Demack, 2018; Guskey, 2002; M. Kennedy, 2016). Articulating clear goals and a theory of change for how these goals can be achieved is, however, a critical first step for designing and evaluating teacher PD programming. Without these conceptual tools we cannot make principled decisions about the content, features, and structure of PD programming, nor can we assess whether the program achieved its intended goals.

In this working paper we aim to articulate Steplab's goals for teacher development, our theory of change for how to reach these goals, and how Steplab's design puts this theory of change into practice.

1. What does the research tell us about teacher learning?

The literature on teacher PD is flooded with a wide array of empirical studies and theories of teacher learning and development that identify different goals for teacher development, different mechanisms that help achieve these goals, and different ideas about how these mechanisms and characteristics of the local context might interact to enhance or disrupt teacher development. This results in a wide range of relevant concepts that researchers and PD designers may consider when developing a theory of change to guide program design and evaluation.

In addition to the navigating the complex landscape of research on teacher professional development, there are several other related fields to which researchers and PD designers may turn for inspiration, including literature on adult learning, professional development literature from fields like medicine and law, and psychological studies of learning and change. Making sense of these disparate sources is a monumental task. Indeed, it is not uncommon for PD programs to develop a theory of change based on only a few, closely related theories of teacher development.

While the purpose of this working paper is not to conduct a comprehensive and systematic review of all relevant literature, Steplab is committed to ensuring that our theory of change and PD programming is based on a breadth of relevant literature. For this reason, we provide a broad and high-level review of what we see as the relevant research literature and discuss how Steplab's work incorporates key insights from this literature.

What does it mean to be a teacher?

As many scholars point out, the specific goals, design, and key mechanisms of PD may vary substantially depending on how one characterizes what teaching is and what being a good teacher means (M. Kennedy, 2016; Winch et al., 2015). If, for example, we subscribe to the common characterization of teaching as art or craft and believe that good teaching is highly specific to individual teachers, students, and contexts, then PD should provide teachers with access to master teachers with whom they can apprentice, experiment, and gain experience (Winch et al., 2015). This characterization is often contrasted with views of teaching as the execution of technical know-how, wherein the role of PD is to provide teachers with the ability to implement generalizable research-based strategies and techniques that are effective across contexts (Winch et al., 2015).

While the former perspective may provide greater room for teacher agency and collegial collaboration, it can also lead to the rejection of educational research findings, an 'anything goes' mentality, and the ossification of ineffective or even harmful practices passed down through generations of teachers. Conceptualizing teaching as the execution of evidence-based best practices, on the other hand, avoids some of these dangers at the expense of teacher agency and context-specific judgment. Recognizing these challenges, we draw on more balanced conceptualizations of teachers as professionals who, like doctors, lawyers, and other highly skilled professionals, rely on technical knowledge, insights gained over time through experience, and situation-specific judgment that support rather than limit their agency (Crowe, 2008; Hatano & Oura, 2003; A. Kennedy, 2005, 2014; McDiarmid & Clevenger-Bright, 2008; Winch et al., 2015).

What do teachers need to learn?

Conceptualizing teachers as professionals makes designing PD programming especially challenging because it requires designing PD that can support the dual goals of advancing both teachers' technical knowledge and their professional judgment in applying this knowledge in action (Clarke & Hollingsworth, 2002; Diez, 2010; Guskey, 2002). Only by supporting and balancing both goals can PD programming help teachers develop into adaptive experts, who can flexibly and effectively apply their technical knowledge to their unique contexts and adjust when these contexts change (Bransford et al., 2005; Hatano et al., 1986; Hatano & Oura, 2003; Korthagen, 2017; Schwartz et al., 2005). To do so, we must have a clear idea of the kinds of technical knowledge and professional judgment capacities that teachers need to effectively serve their pupils.

While many PD programs focus on specific elements of teaching, such as culturally responsive pedagogy or supporting social and emotional learning, Steplab aims to provide more comprehensive support so that we can meet teachers wherever they are on their journey toward professional expertise. Given our focus on developing teachers' ability to integrate technical knowledge and professional judgment we organize our learning goals not around specific knowledge areas or skills, but rather around what we view as the central goals of teachers' daily work that support pupil learning.

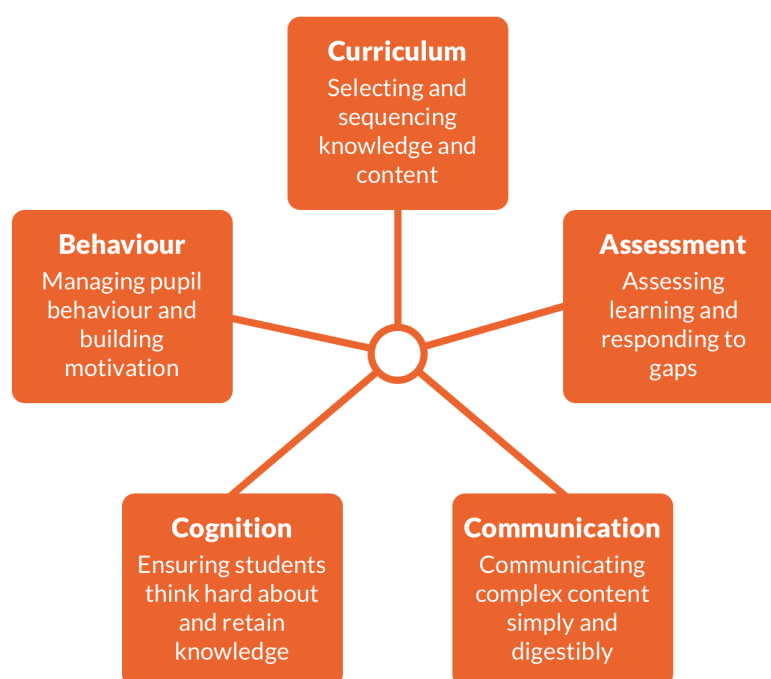


Figure 1. *Steplab core goals of teacher professional learning.*

This framework was developed by Steplab's founder in concert with other experienced teachers and leaders of PD. It was also inspired by existing academic literature that aims to identify the core challenges of teaching for the purposes of supporting teacher development in these areas (e.g. Berliner, 2001; M. Kennedy, 2016; Knight, 2007). While novices and early career teachers are more likely to require support developing foundational skills and practices that help them achieve these goals, all goals continue to be relevant as a framework for reflection and development even for experienced and expert teachers.

In this way, we try to avoid the common pitfall of portraying effective teaching as a static recipe of techniques and instead prioritize a focus on making intentional decisions about how to use and balance different techniques to achieve specific purposes in specific situations (Feldon, 2007; Hobbiss et al., 2021; M. Kennedy, 2016, 2016).

Given our interest in ensuring that the techniques teachers use and how they use them are informed by the large body of research on teaching and learning, a key part of Steplab's model is our detailed curricular framework that connects these five purposes of teaching to sub-goals and increasingly more granular techniques that teachers can use to achieve them. For example, with the domain of Cognition the Steplab curricular framework includes the goal of *Accountable Questioning*, which is divided into sub-goals, which are further divided into steps, as shown in **Figure 2**. This structure ensures that even when teachers are learning and practicing a granular step, they continue to engage with the purposes for which the step can be used and remember that there are other steps and sub-goals which may also contribute to these same purposes.

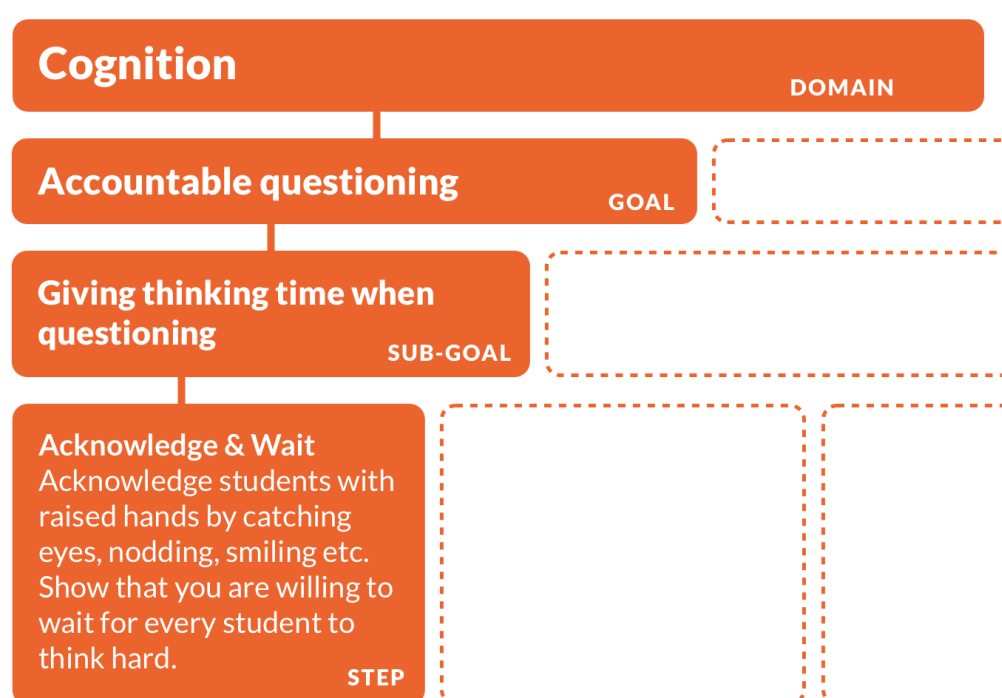


Figure 2. Structure of the curricular framework under Steplab's PD programming.

While a detailed description of this framework is not possible here, we note that the structure of the framework is inspired by the last two decades of discussion about how to parse the practice of teaching to guide teacher education curricula (e.g. Boerst, et al., 2011; Grossman et al., 2009; Grossman & Dean, 2019; Grossman & McDonald, 2008; Loewenberg Ball & Forzani, 2009; McDonald et al., 2013) and its content is grounded in empirical research on effective teaching practices. For example, in **Figure 2**, the step and sub-goal are grounded in empirical research on wait time and the limitations of working memory (Rowe, 1986; Tobin, 1987), the goal is grounded in research on classroom discussion (Resnick et al., 2018), and the entire domain is grounded in earlier articulations of the core problems of teaching (e.g. M. Kennedy, 2016) and the idea that to effectively support student cognition, teachers must have a foundational understanding of the psychology of student learning (e.g. Willingham, 2017).

How can we develop teacher expertise?

Supporting teachers with understanding the purpose of the techniques included in the Steplab curricular framework and helping them implement them is not enough, on its own, to truly develop teachers' professional expertise and support student learning. Even if we help teachers build a general understanding of the kinds of situations in which a particular technique may be helpful and the kinds of situations where it may not be, we cannot possibly provide prescriptions for what techniques to use or how to use them in all future situations that a teacher may face (Lampert & Graziani, 2009). Indeed, this is precisely why we conceptualize teaching expertise as a marriage of technical expertise and professional judgment. Therefore, in addition to our curricular framework outlining foundational teaching technical expertise, Steplab has also identified five components that prior research suggests are central to exercising professional judgment and building adaptive expertise.

Goal-Setting	Teachers must have clear goals for student learning and classroom culture as well as at least an initial idea or hypothesis for how to make progress toward these goals through their instructional practice (Barnhart & van Es, 2015; Hiebert et al., 2007; Santagata & Angelici, 2010; Winch et al., 2015).
Situation Awareness	Teachers must be able to direct their limited attention and working memory capacity to notice key information about what's happening in the classroom (Barnhart & van Es, 2015; Berliner, 2001; Correnti et al., 2021; Dewey, 1933; Endsley, 2006; Erickson, 2011; Feldon, 2007; Hiebert et al., 2007; Miller, 2011; Moos & Pitton, 2014; Sabers et al, 1991; Schon, 1983; Van Es & Sherin, 2002; Wolff et al, 2021).
Connection & Interpretation	Teachers must be able to process what they notice in light of their professional knowledge, goals, and beliefs, and interpret the evidence to identify key problems that need to be solved or decisions that need to be made and identify potential solutions or options (Barnhart & van Es, 2015; Correnti et al., 2021; Feldon, 2007; Hiebert et al., 2007; Jacobs et al., 2010; Levin et al., 2009; Van Es & Sherin, 2002; Winch et al., 2015).
Forecasting & Decision-Making	Teachers must be able to anticipate the consequences of different options or solutions and weigh these consequences in light of their goals, beliefs, and interpretations to reach a decision about how to respond (Barnhart & van Es, 2015; Colton & Sparks-Langer, 1993; Correnti et al., 2021; Feldon, 2007; Hiebert et al., 2007; Santagata & Angelici, 2010).
Enactment	Teachers must be able to act in accordance with their intentions and goals in classroom environments where the intense cognitive demand on teachers makes it difficult to introduce new practices or alter existing instructional habits (Feldon, 2007; Hobbiss et al., 2021; M. Kennedy, 1999; Korthagen, 2017; Moos & Pitton, 2014).

Figure 3. Five components of developing teacher expertise

Like the goals that make up the curricular framework discussed above, teachers can and do engage with these elements of professional judgment both during instruction and outside the classroom when engaged in reflecting on prior lessons or planning for future instruction (Feldon et al., 2007; Winch et al., 2015). Furthermore, neither the curricular framework nor the

components of professional judgement represent discrete elements of teaching practice that can be addressed in isolation.

For any given lesson or even moment in a lesson, all five goals for student learning can and often should be considered and teachers must make decisions about how to balance these goals when they come in conflict with one another, both during instruction and when planning for future instruction (M. Kennedy, 2016). Likewise, teachers cannot exercise goal-setting in isolation from the other components of professional judgment as the goals teachers develop necessarily depend on what they have previously noticed and how they've interpreted it (Correnti et al., 2020; Feldon, 2007).

Conversely, what teachers notice and how they interpret these noticings depends heavily on their goals and existing mental models, which are informed by what teachers have noticed, interpreted, decided, and implemented in the past (Berliner, 2001; Colton & Sparks-Langer, 1993; Correnti et al., 2021; Feldon, 2007). This means that a teacher may be adept at exercising professional judgment in some situations or areas of teaching, but struggle in other areas where their goals and mental models are less clear (Berliner, 2001; Moos & Pitton, 2014). Like expertise in other fields, professional judgment in teaching is not a generic skill, but rather develops in the context of specific domains of instructional practice (Correnti et al., 2021). In Steplab's case, we use our curricular framework to shape the domains and sub-components within which we hope to develop teachers' professional judgment.

How can we help teachers to free up cognitive space?

As these frameworks begin to illustrate, exercising professional judgment in enacting technical knowledge to support student learning is complex and cognitively demanding, especially if we expect teachers to consciously engage in goal-setting and other components of professional judgment when in the classroom. Because of the limits of working memory, much of this processing appears to happen unconsciously in practice (Feldon, 2007; Hobbiss et al., 2021; Korthagen, 2017; Moos & Pitton, 2014). How these processes play out, however, depends on a variety of factors, including teachers' emotions, mental models, and habits, which vary based on teachers' knowledge and experience (Feldon, 2007; Korthagen, 2017; Moos & Pitton, 2014). Indeed, expert teachers often report little conscious attention to areas that novices spend much of their mental energy contemplating, freeing up capacity for expert teachers to notice and process additional information that novices may miss completely (Feldon, 2007; Hobbiss et al., 2021).

Thus, one of Steplab's goals in supporting teachers' development of professional expertise is to help teachers develop greater awareness of classroom events and their own existing habits and automatic responses so that they can be disrupted and changed in cases where they are not supporting pupil learning (Colton & Sparks-Langer, 1993; Korthagen, 2017). Given the limitations of working memory, however, we cannot expect teachers to simply engage in more conscious processing. Instead, we also aim to help teachers create lasting change in their practice by helping them shift beneficial conscious processing to become less conscious and more automatic over time. In this way, we recognise and attempt to address both the advantages and disadvantages of automaticity (Feldon, 2007).

Finally, we aim, through repeated practice and the gradual release of responsibility over time (Collet, 2012), to support teachers' ability to draw on these components of professional judgment to inform not just individual instructional decisions, but also how they approach and manage their own development as professionals (Korthagen, 2017).

2. How can PD support technical skill and judgment?

If we followed the traditional approach to PD, Steplab would develop a series of workshops or online modules to teach the content of Steplab's curricular framework and demonstrate how teachers can apply the five components of professional judgment to successfully incorporate this content into their teaching. Perhaps the modules would include a few practice activities for teachers to try their hand at using some of the techniques or components of professional judgment. However, teachers would be largely left on their own to work out whether and how to apply what they learned to their daily classroom instruction.

This approach is unlikely to lead to much change in how teachers exercise their professional judgment or the instructional practices they use. Research on PD programming and teacher preparation experiences has increasingly demonstrated the importance of ongoing support and collaboration with expert others in reflecting on and planning for real, day-to-day classroom instruction for strengthening teachers' professional judgment and facilitating long-term change in teachers' instructional practices (Barnhart & van Es, 2015; Darling-Hammond et al., 2017; Desimone & Pak, 2017; Erickson, 2011; Gelfuso & Dennis, 2014; Lampert & Graziani, 2009). In this way, PD programming can provide not just new technical information, but also provide an opportunity for intensive scaffolded practice using professional judgment to apply that information to the teachers' own classroom(s) (Colton & Sparks-Langer, 1993).

While the research literature highlights several different PD structures that can provide effective ongoing support and collaboration (Darling-Hammond et al., 2017; Hill et al., 2021), Steplab has built its PD model around the structure of instructional coaching, where a coach with substantial teaching experience regularly observes a teacher's instruction and then meets with them to collaboratively discuss the observation and how to develop their practice (Denton & Hasbrouck, 2009; Knight, 2007; Sims & Fletcher-Wood, 2021; Teemant, 2014), for several reasons.

First, there is a wealth of empirical and conceptual evidence suggesting that coaching can create meaningful changes in teachers' instructional practices and student learning (Desimone & Pak, 2017; Hanno, 2021; A. Kennedy, 2005, 2014; Kraft et al., 2018; Papay et al., 2020). Second, because coaches observe and meet with teachers one-on-one, coaching is uniquely individualized and customizable, making it especially well-suited for providing ongoing professional development support to a wide range of teachers based on their individual skills, beliefs, knowledge, experience, and unique developmental trajectories (Korthagen, 2017; Sisson & Sisson, 2017; Thomas et al., 2015). Finally, the widespread popularity of coaching in research and in practice makes it a familiar structure for schools (Knight & van Nieuwerburgh, 2012; Lofthouse, Leat, & Towler, 2010; Lofthouse, Leat, Towler, et al., 2010). Many schools, therefore, will be able to leverage existing structures to ensure that coaches and teachers have dedicated time to participate in coaching, allowing school leaders to focus on supporting the content of coaching conversations instead of the logistics of them (Boguslav et al., 2022).

Within the instructional coaching structure of observation and debrief, there is enormous variety in the details of how coaches approach and facilitate these cycles (Bean et al., 2010; J. Knight, 2009; Kraft et al., 2018). However, comparatively little is known about which variations and details make a difference for teacher learning and development (Boguslav, 2022; Cornett & Knight, 2009; Gibbons & Cobb, 2017; Robertson et al., 2020). Large-scale quantitative studies highlight several structural features, such as dosage and content-focus, that may be important,

but the results of these studies are often inconsistent with one another (Blazar & Kraft, 2015; Cohen et al., 2020; Hill et al., 2021; Kraft et al., 2018).

Furthermore, evidence for the benefits of structural features provides little information about the details of what coaches should say and do during their coaching sessions with teachers, which many qualitative studies highlight as a key part of how coaching can support teacher development (e.g. Gallucci et al., 2010; Gibbons & Cobb, 2017; Glover & Reddy, 2017; Heineke, 2013; Kurz et al., 2017; Walpole et al., 2010; Woulfin, 2018).

Qualitative studies offer many ideas about what kinds of coaching practices may support teacher learning and development but synthesizing these ideas into clear implications for the design of coaching programs has proven difficult. There is substantial debate, for example, over the extent to which coaches should use their time with teachers to provide directive guidance and suggestions, create opportunities for teacher-led reflection, or draw on a mixture of both strategies (Deussen et al., 2007; Dozier, 2006; Ippolito, 2010; J. Knight, 2009). These studies also typically employ very small sample sizes, raising the question of how likely their results are to generalize beyond the teachers and coaches included in each study's specific sample.

Given the lack of a coherent vision of high-quality coaching in the existing literature, it is not possible for Steplab's coaching model to be consistent with all prior work. While we are attentive to existing research on coaching and strive to stay abreast of new developments, Steplab's current coaching model is also guided by research on teacher PD more generally, novice teacher education, and student learning, as well as the professional experience of Steplab's staff as coaches and PD facilitators. Most importantly, we are guided by continuous feedback from our partner schools.

Steplab's coaching model is built around five key mechanisms that research suggests can support the development of teachers' technical expertise and professional judgment:

1. Diagnosis

The benefits of personalized, 1-1 coaching support can only be realized if coaches have a deep understanding of their teachers' unique beliefs, knowledge, experiences, skills, and students and can use this understanding to tailor the coaching support provided to each teacher's needs. In addition to careful observation of teachers' instruction in the classroom to identify areas for development (Gibbons & Cobb, 2016), Steplab's coaching model includes several kinds of questioning strategies that coaches can use to understand the causes behind teachers' current practices and what changes are necessary to develop those practices (Gallucci et al., 2010; Gibbons & Cobb, 2016).

For example, by asking the teacher questions about what happened in the observed lesson, a coach can learn whether the teacher already has sufficient situation awareness to recognize and act on a particular area of development. The coach can then adjust how they use their time in the coaching conversation to either help develop the teacher's situation awareness or address other potential needs (Colton & Langer-Sparks, 1993). Furthermore, with a clear understanding of the teacher's thinking and knowledge, coaches can also make informed decisions about whether and how to use the other four coaching mechanisms discussed below.

2. Scaffolding

In addition to allowing the coach to diagnose a teachers' needs, coaches can also use questioning strategies during coaching conversations to help scaffold teachers' professional judgment (Barnhart & van Es, 2015; Colton & Sparks-Langer, 1993; Correnti et al., 2021; Gibson, 2006; Heineke, 2013; Koh & Neuman, 2006; Santagata & Angelici, 2010). For example, by asking additional, more structured questions about what occurred in the observed lesson, how to interpret these events, and how to respond in future lessons, a coach can help guide a teacher through key elements of professional judgment, including situation awareness, connection and interpretation, and forecasting and decision-making (Korthagen, 2017; van Es & Sherin, 2002).

In addition to providing an opportunity for teachers to engage in active cognitive processing (Desimone & Pak, 2017; Niemi et al., 2016; Shernoff et al., 2015), scaffolded questioning also provides teachers with an opportunity to engage in deliberate practice of key professional judgement skills in a controlled and supportive environment (Grossman, Compton, et al., 2009; Sims et al., 2022) before applying those skills to the cognitively complex environment of the classroom.

3. Instruction, feedback, & modelling

While some coaching models suggest that coaches should not provide directive suggestions or guidance (e.g. Costa & Garmston, 2015), Steplab embraces a more flexible approach in which the coach's directiveness depends on their diagnosis of the teacher's needs (Ippolito, 2010). No amount of scaffolded questioning can get a teacher to notice a specific student's behaviour if they didn't see it in the first place or decide to use wait time if they have never learned about it. In these cases, when a coach diagnoses a gap in the teacher's knowledge or awareness, they can provide expert instruction by sharing what they noticed during the classroom observation, explaining key content and pedagogical concepts, suggesting new instructional strategies, and modelling how these instructional strategies are implemented in practice (Gibbons & Cobb, 2017; Gibson, 2006; M. Kennedy, 2016; Robertson et al., 2020).

4. Deliberate practice

While scaffolded questioning provides an opportunity for teachers to practice exercising professional judgment, teachers also need practice implementing new instructional techniques so that they can enact them in the classroom when appropriate (Cohen et al., 2020; Ericsson & Pool, 2016; Ippolito, 2010; Reddy et al., 2019). Coaches can provide deliberate practice opportunities within the coaching session through role-play and other approximations of practice (Grossman, Compton, et al., 2009), where teachers can try out implementing the techniques and receive feedback from the coach.

Coaches can also help ensure that teachers engage in deliberate practice in the classroom by helping teachers think through how and when to apply a new technique to a future lesson and providing feedback in the following coaching conversation (Ericsson & Pool, 2016; Joyce, B.R. & Showers, B., 1981). In addition to fostering teachers' proficiency in enacting a new technique, such deliberate practice can also foster automaticity (Feldon, 2007; Hobbiss et al., 2021).

5. Motivation

Teacher motivation is a vital yet often overlooked prerequisite for teacher learning and development (Gorozidis & Papaioannou, 2014; Guskey, 2002; Hill et al., 2021; M. Kennedy, 2016; Power & Goodnough, 2019). In addition to helping teachers recognize the potential

benefits and purposes of a particular instructional goal or strategy through the other mechanisms discussed above, Self-Determination Theory (Deci, 2009; Korthagen, 2017; Ryan & Deci, 2000) provides several other routes through which coaches may support teacher motivation.

First, coaches can help support teachers' feelings of competence and efficacy by providing encouragement and helping teachers see their own professional growth, strengths, and positive impacts on students (Collet, 2012; J. Knight, 2009; Kurz et al., 2017). Second, coaches can help support teachers' feelings of relatedness by building a strong relationship of mutual respect, trust, and support (J. Knight, 2009; Lowenhaupt et al., 2014; Power & Goodnough, 2019; Shernoff et al., 2015). Third, coaches can help support teachers' autonomy by creating opportunities for teachers to express their views and exercise choice and influence over what happens in the coaching session and its implications for their classroom instruction (M. Kennedy, 2016; J. Knight, 2009; Power & Goodnough, 2019).

3. How can we implement quality coaching at scale?

Alongside the growing evidence of the benefits of coaching for teacher development and student learning, there is also growing evidence that it is difficult to implement high-quality coaching programs at scale that can realize the effects seen in smaller-scale researcher-controlled studies (Hill et al., 2021). In their meta-analysis of coaching programs, Kraft et al. (2018) found that coaching programs serving more teachers tended to have substantially smaller effects on teacher development and student learning.

Other studies highlight the challenges that coaching programs create for districts, schools, and coaches. As a result of state, district, and school-level conditions, coaches often don't have adequate time to regularly visit teachers' classrooms and conduct debriefing conversations (Bean et al., 2010; Boguslav et al., 2022; Deussen et al., 2007). The literature also points to the wide range of complex skills that coaches need to effectively guide teacher development (e.g. instructional expertise, relational skills, and a deep understanding of teacher learning and development) and the many cases where coaches have struggled to live up to a particular researcher or program's vision of high quality coaching (Blazar et al., 2021; Blazar & Kraft, 2015; A. Kennedy, 2005; Lofthouse, Leat, Towler, et al., 2010).

In working with individual schools and school networks, Steplab is attentive to the challenges of implementation. Every school and network leader working with Steplab participates in training to support initial implementation. This training includes:

- **Building a vision** Supporting leaders with developing a clear understanding of the Steplab platform and a clear vision and goals for how the platform can support teaching and learning. This includes support leaders with creating a vision of the key conditions required for successful implementation, including school culture.
- **Building culture** Supporting school and network leaders with communicating to teachers and coaches about Steplab to ensure common understandings of the goals and purposes and promote buy-in.
- **Building systems** Supporting school and network leaders with implementation logistics, including how to create coach-teacher pairings and ensure that coaches and teachers have sufficient time to engage in observation and coaching (Bean et al., 2010; Boguslav et al., 2022).
- **Building capacity** Supporting school and network leaders with providing professional development for coaches and supporting coaches with understanding the Steplab model and platform (Galey, 2016; Woulfin & Rigby, 2017).

In an ideal world, Steplab would be able to help schools identify skilled coaches to work with all their teachers. In practice, however, we know little about how to identify skilled coaches (Blazar et al., 2021). Perhaps more importantly, most schools likely lack the financial and human capital resources to hire only experienced coaches with a demonstrated track record of high-quality coaching (D. S. Knight & Skrtic, 2021; Moody, 2019; Myung et al., 2013). Given these realities, Steplab focuses instead on providing a robust system of supports to help all coaches provide high-quality coaching.

Drawing on Steplab's theory of teacher development is also relevant for coach development, Steplab works directly with each school's coaches to provide intensive induction programming focused on the Steplab curriculum and theory of teacher development. Rather than leaving coaches to enact this knowledge on their own, as many coaching programs do, Steplab's online

platform is specifically designed to provide coaches with in-the-moment guidance as they observe teachers' instruction, plan for coaching conversations, and conduct these conversations (Glover et al., 2019). While the support provided by the online platform is not as individualized as that provided by ongoing coaching for coaches (Stock & Duncan, 2010), the online platform is substantially easier and less costly to implement at scale and easier and less costly to adapt in response to new research or changes.

Furthermore, the tight control that Steplab has over the content of the platform, its scale, and its digital nature mean that the platform is uniquely suited as a tool for conducting robust research on teacher and coach development. Specifically, Steplab can conduct A/B tests by randomly assigning two different version of the platform to different coaches to test the effects of different kinds of support on coaching practice and different kinds of coaching practice on teacher development (Glover et al., 2019; Koning et al., 2022). We can then adjust the platform as we learn more about how to best support coaches and teachers.

In the same way that the online platform serves as an ongoing support for coaches, the online platform also has features designed to provide school and network leaders with in-the-moment tools for managing the implementation of coaching across entire schools and school networks. Specifically, the platform provides school and network leaders with access to coaching data and convenient tools for communicating with coaches to provide feedback and reinforcement for coaches and teachers.

Putting theory into practice

Figure 4 summarizes the theory of change that underpins Steplab's coaching model. Specifically, we believe that Steplab's online platform and coaching curriculum provides key supports to help coaches diagnose teacher needs and provide appropriate scaffolding and instruction to develop teachers' professional judgment and understanding of how they can improve their instructional practice, foster teachers' motivation to change their instructional practice, and provide opportunities for deliberate practice to help teachers develop high quality instructional habits.

As a result of this ongoing support, teachers will develop stronger professional judgment and technical skills to successfully manage student behaviour, sequence lesson content, communicate content to students, facilitate student cognition, and assess student learning. Finally, as a result of improvements in teachers' instruction, we expect student learning to increase as well. Below, we explore the Steplab curriculum and online platform in more detail as the initial step in this causal chain.

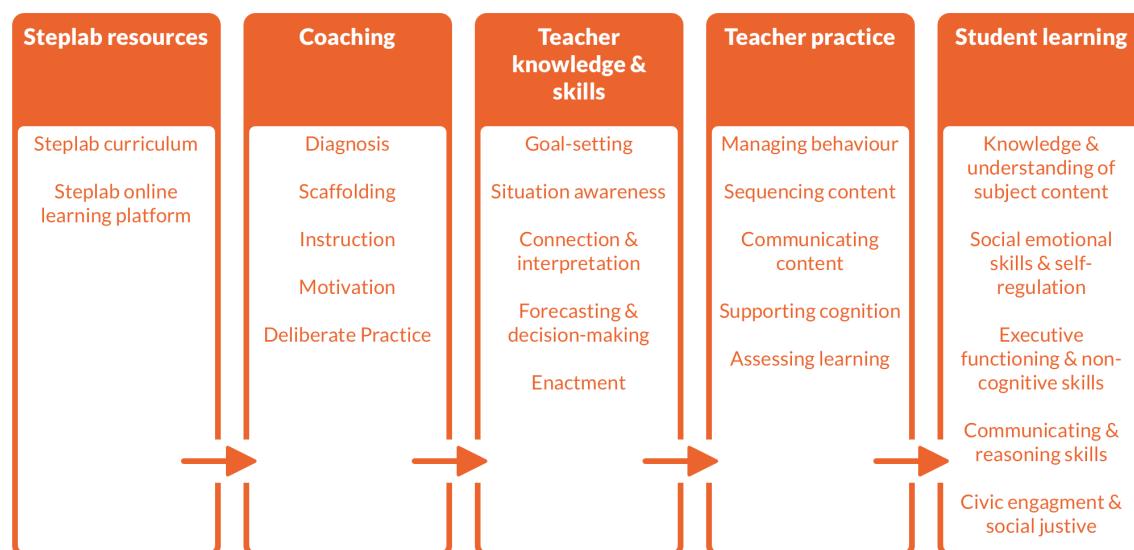


Figure 4. Steplab's theory of change.

The Steplab curriculum

The online platform provides coaches with access to Steplab's entire curricular framework to guide coaches with selecting action steps for teachers to work on after each observation. Coaches can review mini modules for each step within the curricular framework to make informed choices about what to work on with teachers and ensure that coaches feel confident discussing each step with a teacher. These mini modules include information about the mechanisms that underpin student learning in their chosen area, alongside tips about what to look for when they next visit their teacher's lesson to see the step in action. Coaches can also share these mini modules with teachers to allow them to explore more information about a step on their own time.

The Steplab platform

In addition to providing access to the curricular framework, the online platform is designed to provide coaches with in-the-moment support for conducting teacher observations and facilitating coaching conversations. After selecting a specific teacher, coaches open the interactive observation form to take notes during their observation. The observation form first prompts coaches to look for evidence of the teacher's success with the specific step the teacher is working on by automatically "serving up" a summary of the step and key criteria the coach can use to judge the teacher's success.

In addition to providing coaches with a place to take notes as they choose, the observation form also includes several buttons and specific prompts to support coach efficiency and prompt coaches to plan for key moments in their coaching conversation. For example, coaches can use toggles to easily record information about the teacher's success with a step. When coaches are ready to select the teacher's next step, they can use the "Select Next Step" button to access the Steplab curricular framework to identify the appropriate next step. Coaches also have the option to write their own step to best meet the teacher's developmental needs.

Once the coach finishes filling out the observation form, all the information they've entered is saved and used to provide individualised supports during the coaching conversation. At the

beginning of a coaching conversation (or beforehand if a coach wishes to mentally prepare), coaches can open the interactive feedback form. This form then guides coaches through the key stages of the coaching conversation by prompting them with the relevant information and notes from the coach's observation form. For example, the platform supports coaches with giving feedback on the teacher's previous step by "serving up" what the action step is, the praise the coach planned during the observation, and the coach's assessment of the teacher's practice relative to the key criteria for that step.

Finally, schools and networks can select particular personnel (e.g. head teachers and teaching and learning leads) to receive access to user-friendly reports that summarize how coaching is being implemented across an entire school and/or network. These reports provide high-level information about what coach-teacher pairs are engaging in coaching, how often each pair is engaging in coaching, and what content from the Steplab curriculum teachers are working on. Network leaders can compare these data across schools to identify schools that may need more intensive implementation supports.

School and network leaders can also select to see more detailed information about particular coach-teacher pairs or even particular coaching observations or conversations in order to look beyond coaching frequency to understand the content and quality of coaching.

Alongside these data, the platform also provides easy ways for leaders to send public shout-outs or private messages of praise, reminders to complete coaching, or constructive suggestions to specific coaches or teachers as they view the data for their school or network. In this way, Steplab aims not only to provide leaders with ongoing data about coaching implementation, but also to provide easy ways for leaders to encourage and support high quality implementation.

Finally, in addition to supporting coaching observations and conversations directly, the Steplab platform also supports no-stakes informal "drop-in" observations where anyone in a school can observe another teacher in action, see the action step the teacher is working on, and provide feedback. Coaches can also suggest that their coaches complete a "drop-in" with specific teacher(s) as an additional scaffold. In this way, Steplab aims to help schools develop a culture of professional learning and collaboration that can facilitate teacher learning and retention (Bryk & Schneider, 2002; Flores, 2004; Kraft & Papay, 2014; Martin & Kragler, 1999; J. P. Papay et al., 2020; Smith & Ingersoll, 2004).

Conclusion

While we believe in the value of our current model as a strong start for supporting schools with translating current research on PD into practice, we also recognise that our model is not consistent with all existing research on PD. Furthermore, while the model is heavily influenced by existing theoretical and empirical research, we recognise that the exact details of Steplab's model and platform have not been empirically evaluated to demonstrate effects on teacher and student learning. Steplab is currently engaged in conducting internal research to better understand how the platform is being used in schools and where there are opportunities for improving the platform to better support school leaders, coaches, and teachers. We are committed to continuous improvement and refinement based on our own internal research and as new research from other contexts is published. Once we have completed an initial cycle of internal data analysis and platform improvement, we are hoping to obtain funding to conduct an initial evaluation of Steplab's impact on teacher development.

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