

Supporting Implementation of Evidence-Based Practices Through Practice-Based Coaching

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Abstract

In active implementation science frameworks, coaching has been described as an important competency “driver” to ensure evidence-based practices are implemented as intended. Empirical evidence also has identified coaching as a promising job-embedded professional development strategy to support implementation of quality teaching practices. The purpose of the present article is to describe a coaching framework designed to support early childhood teachers to implement evidence-based teaching practices with fidelity. We explicate the key components of the coaching framework, provide theoretical and empirical rationales for each component, and describe how it was operationalized for use as a coaching protocol in several studies. The studies focused on supporting preschool teachers of young children with or at risk for disabilities to implement social-emotional, behavioral, and instructional teaching practices with fidelity. For this special issue, we offer recommendations for future research and considerations for wider scale application and situate each article in the context of coaching and the coaching framework described in this article.

Keywords

intervention, strategies, personnel, professional development, coaching, intervention practices

In the context of active implementation science frameworks, staff selection, training, and coaching have been identified as important “drivers” to develop or enhance practitioners’ competence to implement evidence-based practices as intended (Metz & Bartley, 2012; Metz, Halle, Bartley, & Blasberg, 2013).

Training and coaching are two forms of professional development (PD) that can be subsumed under a broader definition of early childhood PD offered by the National Professional Development Center on Inclusion (NPDCI). NPDCI (2008) defines PD as “facilitated teaching and learning experiences that are transactional and designed to support the acquisition of professional knowledge, skills, and dispositions as well as the application of this knowledge in practice” (p. 3). Training and coaching often are linked as forms of PD to build and sustain the competence and confidence of practitioners to implement evidence-based practices as intended (Snyder, Hemmeter, & McLaughlin, 2011; Snyder et al., 2012).

PD is receiving significant attention in both research and policy contexts given its important role in preparing and supporting a knowledgeable and skilled early childhood workforce (Institute of Medicine and National Research Council, 2015; Winton, Snyder, & Goffin, in press; Zaslow, Tout, Halle, Whittaker, & Lavelle, 2010). A growing body of research is focused on characterizing promising features

of early childhood PD associated with measurable change in teacher practice and related child outcomes (Diamond, Justice, Siegler, & Snyder, 2013; Snyder et al., 2012). Among the promising features identified to date is that PD should be cohesive and sustained over time rather than episodic, one-shot training. The content of PD should focus on explicit curricula, interventions, or sets of practices rather than general teaching methods such as lesson planning or instructional grouping methods. PD instructional strategies should include explicit explanations and illustrations of the content or practices to be learned. The provision of job-embedded support is important for implementation fidelity. This latter feature involves supporting learners to use practices in context and providing opportunities for them to reflect on and receive performance feedback.

A number of studies have reported noteworthy impacts of PD that included training and coaching on early

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childhood practitioners' implementation of evidence-based practices. Coaching in these studies focused on supporting implementation of an explicit and coherent set of instructional practices. It included systematic and cyclical processes of collaborative goal setting related to practice implementation, providing repeated opportunities to practice implementation in job-embedded contexts, and engaging in guided reflection as well as giving explicit feedback about implementation (Shannon, Snyder, & McLaughlin, 2015). This type of coaching has been demonstrated to be effective for enhancing teachers' implementation of social-emotional teaching practices (e.g., Artman-Meeker & Hemmeter, 2012; Artman-Meeker, Hemmeter, & Snyder, 2014; Fox, Hemmeter, Snyder, Binder, & Clarke, 2011; Hemmeter, Snyder, Fox, & Algina, 2015; Hemmeter, Snyder, Kinder, & Artman, 2011), positive behavior support strategies (e.g., Conroy, Sutherland, Algina, et al., 2014; Conroy, Sutherland, Vo, Carr, & Ogston, 2014), and literacy practices (e.g., Diamond & Powell, 2011; Hsieh, Hemmeter, McCollum, & Ostrosky, 2009; McCollum, Hemmeter, & Hsieh, 2013). The coaching in these studies provided individualized implementation support for specific environmental, interactional, or instructional practices. It was generally associated with improved fidelity of practice implementation and, in some studies, positive learning outcomes for young children, including children at risk for learning challenges or those with identified disabilities.

Despite this promising evidence, much remains to be learned about what forms (e.g., expert coaching, peer coaching), delivery formats (e.g., face-to-face, web-mediated), and doses of coaching are reliably associated with desired levels of practice implementation for which practitioners and under what conditions (Shannon et al., 2015). In addition, a need exists to define and distinguish coaching from other job-embedded PD such as consultation, mentoring, and technical assistance; to offer a coaching framework focused on implementation of evidence-based interactional and instructional practices; and to describe explicitly the active features or components of the coaching framework (Gupta & Daniels, 2012; Tout, Isner, & Zaslow, 2011).

The purpose of the present article is to define a type of job-embedded coaching focused on supporting early childhood teachers to implement evidence-based teaching practices with fidelity. After defining and distinguishing practice-based coaching (PBC), we describe the framework used to organize its core components and provide theoretical as well as empirical rationales for each component. We illustrate how PBC was operationalized for use as a coaching protocol in several studies that focused on supporting preschool teachers to implement social-emotional and instructional teaching practices. We offer recommendations for future research and considerations for wider scale application in the context of PD and active implementation science frameworks in early childhood. Finally, we situate each article included in the special issue in the context of

coaching and the coaching framework described in this article.

Defining PBC

Several definitions for coaching have been offered in the early childhood or K-12 PD literature. The National Association for the Education of Young Children and the National Association of Child Care Resource and Referral Agencies (NAEYC/NACCRRRA; 2012) defines coaching as a relationship-based process led by an expert to build a practitioner's capacity for specific professional dispositions, skills, and behaviors. Coaching is focused on goal setting and achievement and can be delivered to an individual or group. In the NAEYC/NACCRRRA document, the definition for coaching is distinguished from the definitions for mentoring and consultation, which was also a recommendation made by Tout et al. (2011).

Rush and Shelden (2008) defined coaching as "an adult-learning strategy that is used to build the capacity of a parent or colleague to improve existing abilities, develop new skills, or gain a deeper understanding of practices for use in current and future situations" (p. 1). These authors describe five characteristics of coaching: (a) joint planning, (b) observation, (c) action/practice, (d) reflection, and (e) feedback (Rush & Shelden, 2011). This approach to coaching has been used primarily in early intervention contexts with families and teachers.

Knight (2007) defined instructional coaching as intensive, differentiated support provided by an on-site professional developer who partners with teachers to identify and assist with implementation of research-based instructional practices. This framework includes partnership principles; identifying teaching practices; and the strategies used by coaches to engage teachers in coaching, identify and explain practices, and model, observe, and provide feedback.

Building off these and other coaching definitions, we define PBC as a cyclical process for supporting preschool practitioners' use of effective teaching practices that leads to positive outcomes for children. By teaching practices, we mean specific statements of the actions or behaviors of a teacher that involve manipulating the physical, temporal, interactional, or instructional environment to support child adaptation, competence, or learning. Actions or behaviors (practices) are observable and measurable. PBC is distinguished from other early childhood coaching models by its explicit focus on teaching practices. The goal of PBC is to support teachers' fidelity of implementation of evidence-based teaching practices.

Framework for PBC

The framework for PBC is shown in Figure 1. At the center of the framework are effective teaching practices. The three

components of PBC are shared goals and action planning, focused observation, and reflection and feedback. As shown in the figure, these three components, along with a specified set of effective teaching practices, are implemented in the context of a collaborative partnership between a coach and coachee. The cyclical nature of coaching is also illustrated in the figure. In the sections that follow, we describe further each part of the PBC framework and present theoretical and empirical support for its inclusion.

Effective Teaching Practices

In PBC, the teaching practices are made explicit for both the coach and coachee. Examples of teaching practices are as follows: (a) teacher labels her or his emotions and the emotions of children, (b) teacher greets children by name upon arrival in the classroom, (c) teacher provides specific praise when children interact positively with peers, (d) teacher develops an activity matrix to record planned embedded instructional learning trials for children, or (e) teacher uses systematic instructional strategies to teach a child targeted skills. Teaching practices are derived from evidence-based or recommended practices that, when implemented with fidelity, have been shown through research to be positively associated with child engagement and learning. The practices also can be derived from existing instruments designed to measure teachers' fidelity of implementation of evidence-based practices such as the *Classroom Assessment Scoring System* (CLASS; Pianta, La Paro, & Hamre, 2008), the *Early Childhood Environment Rating Scale* (ECERS-3; Harms, Clifford, & Cryer, 2014), or the *Teaching Pyramid Observation Tool* (Hemmeter, Fox, & Snyder, 2014); from needs assessment or performance-based instruments created by researchers or PD providers (Snyder & Wolfe, 2008); or from curricula used in early childhood programs, which specify teaching practices or instructional methods to be used to implement an activity or lesson.

Empirical support for an explicit focus on teaching practices in PBC is based on several recent literature reviews. Isner and colleagues (2011) examined 48 studies in which coaching was used with early childhood practitioners. The studies reviewed showed positive changes on measures of classroom quality as well as on specific measures of interactional or teaching practices. In 31 of the 48 studies, coaching was focused either on practices to improve overall classroom or environmental quality or specific teaching practices, particularly practices to support young children's language and literacy development.

Winton et al. (in press) summarized findings from 32 studies published between 2006 and 2012 in peer-reviewed journals that used experimental designs in which participants were randomly assigned to PD intervention conditions. The 32 studies included coaching delivered on-site or remotely, often in combination with workshops or courses, and involved early childhood teachers who worked with



Figure 1. Key components of the PBC framework.
Note. PBC = practice-based coaching.

children from birth through 5 years of age. Across the reviewed studies, positive effects were reported on measures of classroom quality, teaching practices, and, in some studies, child learning outcomes. The teaching practices specified in the reviewed studies most often came from curricula or a content domain (e.g., literacy, social-emotional) with a few studies focused on multiple practice domains.

An explicit focus on teachers' actions or behaviors and repeated learning opportunities to be prompted, reflect on, and receive feedback about practice implementation in a job-embedded context is supported by organizational behavioral management (OBM) principles. OBM involves applying behavior analytic strategies to human performance (Crow & Snyder, 1998).

Collaborative Partnerships

PBC occurs in the context of a collaborative partnership. We define a collaborative partnership as a coach and teacher working together to set goals and identify action steps to support practice implementation. Together they identify job aids that might support the teacher's practice implementation; discuss why, when, and how practices will be implemented; problem solve and negotiate strategies to support practice implementation; and engage in joint reflection and feedback about practice implementation.

Collaborative partnerships develop over time as teachers and coaches engage in PBC. They begin by establishing rapport and shared understandings. Rapport can be established through sharing of professional experiences and

backgrounds, establishing a set of shared expectations for time commitments and outcomes, and discussing and reaching a mutual understanding of the purpose and process of PBC (National Center for Quality Teaching and Learning, 2014). The coaching cycle is designed to strengthen the collaborative partnership. All components of PBC require reciprocity and two-way interactions. Each coaching partnership is individualized to the unique strengths, needs, shared understandings, and desired outcomes of the teacher and coach. A successful partnership is one that acknowledges the learner's preferences, strengths, and needs while still ensuring implementation of effective teaching practices.

The PD literature asserts that adult learners are both autonomous and collaborative (Gordon, 2004). The collaborative partnership provides opportunities for teachers to implement practices independently and with the support of a coach. When teachers are implementing newly learned actions or behaviors, having a collaborative partnership with a coach who provides effective prompts and explicit feedback about practice implementation helps shape successive approximations toward implementation fidelity (National Implementation Research Network, n.d.). In addition to helping to support fidelity of practice implementation, the provision of emotional and personal support has been identified by teachers as important to a collaborative partnership (Shannon et al., 2015).

Needs Assessment, Goal Setting, and Action Planning

This component of the PBC framework includes processes for *initial* goal setting and action planning and processes for *ongoing* goal setting and action planning. For initial goal setting and action planning, a needs assessment is conducted. A needs assessment involves gathering data about the teacher's current practices and determining priorities for enhancement or refinement (Snyder & Wolfe, 2008). Needs assessment instruments include the practices that are the focus of coaching. An important feature of these instruments is that the teaching practices should be observable and measurable. The key characteristics of the practices should be made explicit, and anticipated child learning outcomes when the practices are implemented with fidelity should be specified on the instrument.

Based on needs assessment information, goals are written to guide the development, execution, and evaluation of an action plan. Goals should be clearly defined, measurable, and achievable within a defined time frame. Goals ensure accountability. Goal achievement provides opportunities to acknowledge and celebrate progress. SMART (specific, measurable, action-oriented, realistic, time-sensitive) goals based on individual preferences, strengths, and needs are important when coaching for behavior change (Frates, Moore, Lopez, & McMahon, 2011).

Action planning provides a "roadmap" for how goals will be accomplished. Action plans include five features: a goal, action steps, resources, timelines, and a goal achievement statement. Action plan steps should be linked to the practice goal that has been established. An example of a goal is "I will teach children the expectations or steps of morning arrival to help ensure a smoother transition for them." Action steps linked to the goal might be as follows: (a) I will work with my team to identify steps that should occur during the morning arrival; (b) My coach and I will take photos of the morning arrival steps; (c) I will use the photos to make a visual "task list" that shows the morning arrival steps; (d) I will teach the children the steps for morning arrival using the visual task checklist and by modeling appropriate behaviors during morning arrival; and (e) I will provide specific praise to children who are engaging appropriately in or independently complete the morning arrival steps (Shannon & Bishop, 2015). Frates et al. (2011) referred to the action plan as an "accountability" plan and noted the action steps should be tailored to the individual's stage of change or learning. The initial goals and action steps should target small accomplishments to set the stage for larger ones (see Note 1).

Focused Observation

The term "observation" refers to processes associated with gathering information about fidelity of practice implementation. Focused observation is guided by the action plan and associated goals. Information gathered is specific to the goals and action steps rather than only general observation. For example, if the goal is for the teacher to provide specific reminders of expectations before transitions and to provide positive feedback for children who are meeting expectations, targeted actions or behaviors related to this goal would be observed and recorded as part of the focused observation. Focused observation might also involve additional support provided by the coach, use of job aids, or self-monitoring practice implementation. The support provided by the coach might include strategies such as modeling; verbal, gestural, or visual prompts; or brief problem-solving discussions. Focused observation is a key component for promoting fidelity of practice implementation because it likely provides a setting event for the teacher to use the practice (Kretlow & Bartholomew, 2010).

Reflection and Feedback

The third component of the PBC framework involves reflection and feedback. Reflection involves the coach and coachee considering the support strategies used and information gathered about practice implementation to identify successes, challenges, motivators, or next steps related to improvements, refinements, or modifications of teaching

practices. Reflective discussion is an important process for supporting problem solving around practice-implementation issues and identifying what is going well and what might need to be changed. In cognitive coaching and health coaching models, asking open-ended reflective questions, providing reflective comments, and motivational interviewing are described as strategies that can eventually lead to self-reflection, autonomy, and self-efficacy (Frates et al., 2011; Knight, 2007), which is why reflection is part of PBC.

The feedback provided in PBC is performance based. Performance feedback is information provided to an individual about her or his behavior. In PBC, performance feedback involves providing information about fidelity of practice implementation. Both supportive and constructive feedback are provided. Supportive feedback is used to identify and provide positive feedback. Supportive feedback connects information from the observation with the goals and action plan steps and helps illustrate progress. Constructive feedback is used to help recognize opportunities for improving or refining teaching practices. Constructive feedback should be specific and identify steps for strengthening fidelity of practice implementation.

The provision of performance feedback has been demonstrated to support fidelity of implementation of a variety of evidence-based teaching practices (Barton, Kinder, Casey, & Artman, 2011). In addition, studies have demonstrated when performance feedback is included as part of PBC, teachers' fidelity of implementation of targeted teaching practices improves (e.g., Artman-Meeker & Hemmeter, 2012; Fox et al., 2011; Hemmeter et al., 2011). Teachers have also reported they find performance feedback, when provided as part of PBC, to be useful and acceptable (Shannon et al., 2015).

Performance feedback can be delivered in various forms: verbally, graphically, via email, by annotating video, through checklists, and as part of self-reflection (Barton et al., 2011). In PBC, reflection and feedback strategies include viewing video of practice implementation, review of data, role-play, problem-solving conversations, modeling of practices, and providing both supportive and constructive feedback.

Cyclical Process

In the PBC framework, we describe four major phases of coaching. The first phase is an orientation where teachers learn about PBC and how it will be implemented. In the second phase, the partnership between the teacher and coach is beginning to be established. This phase, typically the first through third or fourth coaching session, involves completing observations and needs assessments to determine which practices will be the initial focus of coaching. This phase includes clarification and verification of needs and initial goal setting and action planning. In the third

phase, the PBC cycle involving shared goal setting and action planning, focused observation, and reflection and feedback is completed a number of times. Goals, action plans, and needs assessments are updated, when appropriate. The final phase of coaching involves an assessment and review of goals and accomplishments and development of a plan for sustained implementation of practices that have been the focus of PBC.

Various Formats for PBC

Table 1 summarizes the three components of PBC and the actions that are part of each component. These components and associated actions can be delivered in several different coaching formats. For example, expert face-to-face coaching, expert web-mediated distance coaching, self-coaching with web-mediated support, peer coaching, or group coaching followed by self-coaching. Regardless of the format option, the same components of PBC are implemented. How these components are operationalized differs across the coaching formats. For example, in self-coaching, observation is referred to as "self-monitoring" and reflection and feedback is referred to as "self-evaluation."

To date, the PBC coaching formats that have been explored empirically are expert face-to-face coaching (Conroy, Sutherland, Algina, et al., 2014; Conroy, Sutherland, Vo, et al., 2014; Fox et al., 2011; Hemmeter et al., 2015; Snyder, Hemmeter, McLean, Sandall, McLaughlin, & Algina, 2015), expert web-mediated distance coaching (Artman-Meeker et al., 2014), self-coaching with web-mediated support (Snyder et al., 2015), and self-coaching with expert self-monitoring support (Bishop, Snyder, & Crow, 2015). In each of the studies, training followed by PBC was associated with noteworthy effects on teachers' fidelity of implementation of targeted teaching practices and, in some studies, noteworthy effects on child learning outcomes.

Operationalizing PBC and Measuring Implementation Fidelity

The PBC framework was initially operationalized and used in two potential efficacy group experimental design studies sponsored by the Institute of Education Sciences. In both studies, PBC was designed to support early childhood practitioners to implement interventions with explicit sets of teaching practices. Study 1 focused on teachers' implementation of embedded instruction for children with disabilities. Thirty-six preschool teachers were randomly assigned to one of three PD conditions: (a) 15 hr of workshop training plus on-site and remote expert coaching, (b) 15 hr of workshop training plus self-coaching with web-mediated support, and (c) business-as-usual PD (Snyder, Hemmeter, McLean, Sandall, & McLaughlin, 2013; Snyder et al.,

Table 1. Components of Practice-Based Coaching and Associated Actions by Component.

Component 1: Needs assessment, goal setting, and action planning	Component 2: Focused observation	Component 3: Reflection and feedback
Assess needs	Gather information through observation	Discuss and reflect on observation and progress
Set goals for coaching	Record information about the observation	Provide supportive and constructive feedback
Create an action plan to guide coaching	Use support strategies for improving or refining teaching practices (e.g., models, prompts)	Use support strategies for improving or refining teaching practices (e.g., problem-solving conversations, creating materials)
Review and update goals and action plan, when appropriate		

2015). Study 2 focused on teachers' implementation of *Pyramid Model* practices (Hemmeter, Ostrosky, & Fox, 2006; Hemmeter et al., 2015). Forty teachers were randomly assigned to one of two PD conditions: (a) 19½ hr of workshop training plus on-site, expert coaching or (b) business-as-usual PD. In both studies, teachers in the PD intervention conditions received job aids, including practice-implementation guides, CDs with reproducible documents (e.g., activity matrices, visual schedules), and materials related to the teaching practices (e.g., puppets, books).

The planned dose of coaching provided to teachers in Study 1 was 16 sessions, one session per week for approximately 16 weeks. On-site expert coaching sessions alternated between face-to-face sessions and sessions conducted remotely via email, phone, or videoconferencing exchanges between coaches and teachers. Self-coaching was supported for the same 16 weeks with teachers receiving a weekly email reminder to engage in self-coaching. Teachers in the self-coaching condition had access to a password-protected website where a tip of the week related to embedded instruction was provided along with web-mediated supports for both embedded instruction implementation and self-coaching. The dose of on-site expert coaching provided to teachers in Study 2 was 7 to 17 sessions with a mean of 13.4. The sessions were scheduled to occur weekly, but did not always happen weekly due to holidays and absences.

In both studies, coaching was provided to teachers in the on-site coaching conditions by project-affiliated coaches. Coaches were trained to use the systematic coaching protocol and to record their coaching activities in project-developed coaching logs. In addition, the coaches were trained in either embedded instruction or *Pyramid Model* practices by the developers.

Both the on-site and self-coaching protocols included needs assessments related to the teaching practices that were the focus of workshop trainings. The teachers and workshop trainers completed these at the end of the workshop series. Coaches whose teachers were in the on-site coaching conditions also completed needs assessments during the early phase of coaching based on observations in the

classrooms. They discussed these needs assessments with teachers as part of initial goal setting and action planning processes. Coaches in the on-site coaching conditions conducted focused observations in preschool classrooms and conducted reflection and feedback debriefing meetings with teachers.

Fidelity of Coaching Implementation

On-site coaching was implemented in four phases as described previously: (a) orientation to the coaching process (Session 1); (b) early coaching sessions focused on rapport building, needs assessment, collaborative goal setting, and action planning (Sessions 2 to 3 or 4); (c) later coaching sessions with supportive and constructive performance feedback on action plan implementation (Session 4 and beyond); and (d) a final session to review cumulative progress. Every early and later coaching session had three parts: observation, a reflection and feedback debriefing meeting, and follow-up either by email or phone.

Study investigators developed coaching protocols, which outlined the procedural components of PBC and associated indicators. Observation components consisted of observing, interacting, and making observation notes. The reflection and feedback component indicators were organized under seven headings: (a) opening the debriefing meeting, (b) summarizing and reflecting on the observation, (c) providing supportive feedback, (d) providing constructive feedback (in later coaching sessions only), (e) providing targeted support, (f) discussing planned actions and needed resources, and (g) closing the meeting. Coaches were trained to use a variety of coaching strategies (e.g., modeling, role-play, video demonstrations) during the observations and debrief meetings. Operational definitions were written for each coaching strategy and coaches received training on each strategy.

Coaching implementation fidelity data were obtained from project-developed coaching logs of the coaching components and indicators. Coaches completed logs after each face-to-face session (and after each alternate session in Study 1). Under each PBC component, coaches recorded

whether they implemented each indicator. Coaches also used the log to record the type and timing of each coaching strategy and the duration of each observation or debrief session. We used these data to examine the implementation of coaching components and strategies used during coaching sessions.

For teachers assigned to the self-coaching condition in Study 1, we tracked the delivery and content of the email reminder according to a project-developed protocol. We gathered information using web-analytic software about the pages teachers visited, the time spent on pages, and the types of activities teachers completed on the self-coaching website (e.g., upload video of themselves, self-monitoring their implementation of embedded instruction practices, upload action plan, use of a graphing tool). An average of 15 emails were delivered to and read by each teacher in the self-coaching condition. Mean fidelity to the self-coaching email protocol was 99% (range = 97%–100%). Based on the web-based analytics for the 11 self-coaching teachers who completed the study, 4 teachers engaged in self-coaching at a dose similar to teachers in the on-site coaching condition (i.e., visited self-coaching website at least once every 2 weeks over 16 weeks), 5 teachers visited the self-coaching website periodically (number of visits every 2 weeks for 16 weeks ranged between .2 and .6), and 2 teachers never visited the website even though they received and read the emails. The remainder of this section focuses on implementation fidelity for on-site coaching.

In both studies, for at least 25% of on-site coaching sessions, a trained research assistant observed sessions live, listened to a digital audio recording, watched a video of a face-to-face coaching session, or, in Study 1, read email from the coach to the teacher for an alternate week session. The research assistant used a fidelity checklist to document which coaching log indicators were implemented. The coaching fidelity form was identical to the coaching log completed by coaches. We calculated percentage agreement between the coaching log indicators completed by the coaches and the coaching fidelity checklist completed by research assistants.

Fidelity of Implementation Findings

All but one teacher in Study 1 received 16 coaching sessions. This teacher participated in 13 sessions. In Study 2, the range of coaching sessions implemented was between 7 and 17 and the mean was 13.4. Table 2 shows the amount of time spent in focused observation and debriefing meetings for the two major phases of coaching across the two studies. In general, observations were longer during early coaching sessions than later sessions, particularly in Study 2. The duration of debriefing sessions was similar during early and later sessions in both studies. With respect to coaching strategies used by coaches, similar strategies were used for

observation, and reflection and feedback across both studies, indicating fidelity to the coaching framework and its associated components (see Table 3). In both studies, observation, modeling, and other help in the classroom (e.g., helping to prepare an activity; assisting with transitions) were among the most frequent strategies used during observation, and performance feedback, problem-solving discussion, and reflective conversation were among the most frequent strategies used during debriefing.

Across both studies, we used the coaching logs to examine coaching implementation fidelity. Coaches' reports related to coaching log indicators implemented in Study 1 showed average fidelity to the coaching protocol in early and later sessions of 96.7% (range = 88–100) and 98.1% (range = 86–100), respectively. Based on coaches' reports in Study 2, average fidelity to the coaching protocol in early and later sessions was 80.9% (range = 45.5–100) and 89.1% (range = 50–100), respectively.

Based on the coaching fidelity checklist completed by a second observer, the average fidelity to the coaching protocol for 28% of randomly selected sessions in Study 1 was 96.1% (range = 77–100). Agreement between the coaching log and coaching fidelity checklist for the coaching sessions coded by a second observer was 95% (range = 78–100) in Study 1. Coaching fidelity was collected on 33% of coaching sessions in Study 2 and ranged from 45.5% to 100% with a mean of 87.4%.

Overall, these findings show that the coaching protocol and coaching strategies associated with PBC generally were implemented as intended. Moreover, the descriptions of the key components of PBC and the coaching protocols, the data provided about coaching dose, and the information about the strategies used by coaches across two studies begin to address calls in the PD literature to unpack and report the active ingredients of coaching interventions (Gupta & Daniels, 2012; Zaslow et al., 2010).

Recommendations for Future Research and Practice

Additional studies are needed to compare both various approaches to coaching (e.g., self-coaching, peer coaching, expert coaching) as well as different delivery formats (e.g., face-to-face, web-mediated). For example, emerging evidence suggests web-mediated expert coaching might be a viable alternative to face-to-face expert coaching, provided the coaching approach being used has the core components described in this article (e.g., Pianta, Mashburn, Downer, Hamre, & Justice, 2008; Powell, Diamond, Burchinal, & Koehler, 2010). With respect to various coaching approaches, Snyder et al. (2015) compared on-site expert coaching with web-mediated self-coaching using the PBC framework components across both approaches. They found similar effects across the two approaches on some of

Table 2. Dose of On-Site Practice-Based Coaching For the Two Studies.

Study 1: Embedded instruction (<i>n</i> = 12 teachers)	Study 2: Teaching Pyramid (<i>n</i> = 20 teachers)
Length of coaching = 13–16 weeks	Length of coaching = 12–16 weeks
Mean number of sessions = 15.75	Mean number of sessions = 13
Mean session duration (minutes):	Mean session duration (minutes):
Early phase sessions	Early phase sessions
Observation = 75 (<i>SD</i> = 25)	Observation = 144 (<i>R</i> = 85–205)
Debrief = 40 (<i>SD</i> = 12)	Debrief = 44 (<i>R</i> = 10–135)
Later phase sessions	Later phase sessions
Observation = 72 (<i>SD</i> = 14)	Observation = 105 (<i>R</i> = 30–305)
Debrief = 39 (<i>SD</i> = 12)	Debrief = 38 (<i>R</i> = 15–105)

Table 3. Percentage of Sessions in Which Coaching Strategies Were Used in the Two Studies During Observation and Reflection and Feedback Components.

Strategy	Study 1: Embedded instruction (% of sessions)		Study 2: Pyramid Model (% of sessions)	
	O	RF	O	RF
Observing	100		96.8	
Modeling	27.7		55.7	
Environmental arrangements	4.4		15.1	15.1
Side-by-side gestural support	1.5		6.4	
Side-by-side verbal support	22.6		21.9	
Problem-solving discussion	34.1	78.5	10.5	80.4
Reflective conversation		83.7	20.1	86.3
Videotaping teacher implementation	33.8			
Other help in classroom	49.8		39.8	
Supportive feedback—Verbal		100		81.7
Supportive feedback—Graphic		18.5		17.4
Constructive feedback—Verbal		100 ^a		81.7 ^a
Constructive feedback—Graphic		15.2		17.4
Graphing		8.0		1.8
Providing resources or materials		54.8		44.8
Reviewing teacher video		38.5		
Role-play		6.0		1.4
Video demonstration		4.3		0.9
Goal setting		64.8		42.9

Note. O = observation. RF = reflection and feedback.

^aConstructive feedback provided only in later sessions (i.e., Session 3 or Session 4 and beyond).

teachers' embedded instruction practices (e.g., writing quality embedded instruction learning targets) but not others (e.g., implementing embedded instruction learning trials with fidelity). Several studies in the special issue contribute additional information about coaching approaches and delivery formats and resulting impacts on practice implementation. Much remains to be learned, however, about the relative impacts of different coaching approaches and delivery formats, the conditions under which these formats are used, and impacts on practice implementation and child learning outcomes.

A pressing need exists to continue efforts to unpack and define with replicable precision the components of effective

coaching. Although consensus is emerging from empirical research about the importance of some components (e.g., feedback, reflection, collaborative partnerships, goal setting), only recently have early childhood coaching studies begun to report explicitly the coaching components implemented and how they were operationalized.

In addition to describing and unpacking the components of coaching, it is critical that future research include a careful analysis of the fidelity with which coaching is implemented. This requires that the components of the coaching model being studied are identified and clearly defined, and a systematic process is used for assessing the extent to which the coach implemented the protocol as intended.

Furthermore, it will be important to measure and report the dose of coaching provided. At a minimum, researchers should measure the number of sessions and debriefing meetings that occur, and the length of time spent in observations and debriefing meetings. When other approaches to coaching are used, dose might be measured differently. For example, in a self-coaching model, dose might be measured by the number of times a teacher accesses a self-coaching website, requests opportunities for feedback, or uses specific materials or videos on the website. Without understanding fidelity in terms of adherence and differentiation, it will be difficult to understand issues related to the efficiency and effectiveness of different coaching models, formats, and delivery approaches.

A common concern among administrators and researchers is how much coaching is needed for teachers to reach implementation fidelity of evidence-based practices. Knowledge about the amount or dose of coaching needed is limited by the extent to which researchers have defined clearly their coaching models and components, measured fidelity, and reported specific information dose. Despite these limitations, a few tentative conclusions can be drawn based on the existing empirical evidence. First, there will be a difference in the amount of coaching needed to support implementation of single or a few practices compared with multicomponent interventions. Studies that have examined individual teaching strategies (e.g., Hemmeter et al., 2011) or a small set of teaching strategies (e.g., praise, precorrections, expansions; Conroy, Sutherland, Algina, et al., 2014) generally have required fewer coaching sessions to achieve fidelity of implementation than studies that have examined multicomponent interventions (e.g., Fox et al., 2011; Snyder et al., 2015). Second, implementation science would suggest the presence of other implementation supports (e.g., administrative support, program-wide commitment to an intervention) might reduce the dose of individualized coaching that will be needed (Metz et al., 2013). Third, it is likely that learner characteristics (e.g., knowledge about or experience with the intervention/practices, motivations about implementing practices, self-efficacy) affect the amount of coaching needed.

In programs and service systems, there is a great interest in ensuring coaching can be delivered to promote the implementation of practices that will improve child outcomes (Tout et al., 2011; Zaslow et al., 2010). Although there is sufficient evidence that supports the use of coaching, there are very limited data available to guide programs in determining how to make decisions about when to provide coaching, how to select who will receive coaching, the dose of coaching to provide, and what format of coaching might best match a practitioner's implementation support needs. The coaching of practitioners is resource intensive and the differentiation of how and when to deliver these implementation supports merits further examination in the context of program-wide and system-wide initiatives.

Overview of Articles in the Special Issue: Advancing Knowledge About Coaching

This special *Topics in Early Childhood Special Education* issue includes articles that offer additional insight about the potential of PBC to promote the use of a defined set of practices by practitioners or family members. Of these articles, we have included three studies that offer empirical support for the use of PBC or a similar approach to increase the use of a defined set of practices. The issue also includes a literature review that analyzes the early childhood coaching literature in terms of coaching model components and strategies that have been implemented, the rigor and quality of the research, and the preparation provided to coaches.

The contemporary emphasis on positive child outcomes has necessitated a focus on how to support early childhood teachers to implement evidence-based practices. Particularly in implementation science, coaching has received significant attention as an important competency driver. In the empirical literature, however, there has generally been a lack of specificity in defining coaching models, articulating key components of the models, measuring fidelity of implementation, and reporting dose adequately. To help advance coaching research and practice, the special issue includes articles that articulate a coaching framework, provide a review of the coaching literature, and describe findings from well-designed coaching studies targeting different populations (e.g., families, teachers) and coaching approaches (e.g., self-coaching, expert coaching). This special issue offers a deeper examination of coaching and how practitioners and programs can use it to ensure the delivery of evidence-based practices. Individually and collectively, these articles advance knowledge, contribute to future research, and further support the use of coaching as an important form of PD and a key competency driver.

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Note

1. Additional examples of practice-based coaching needs assessments, goals, and formats for action plans can be requested from the authors.

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