Implementation Development Map: Literature Review for Professional Development

October 2021

Megan Hague Angus, Rebecca Kleinman, Jessica F. Harding

This page has been left blank for double-sided copying.

Literature Review for Professional Development (PD)

In this document, we summarize our literature review on the Professional Development (PD) element of the Implementation Development Map (IDM). We start with an overview, then provide a bulleted list that summarizes the strength of support from professional/expert recommendations or the research literature, and we discuss whether the research speaks to equity. Following the detailed notes are two graphics that summarize, for each IDM indicator, the strength of (1) the research evidence and (2) the support from expert recommendations and professional best practices. The appendix describes our literature search and review process.

A. Overview

Professional development (PD) is one of seven elements identified in the IDM. PD focuses on establishing state-level systems that support the professional development of early childhood teachers, administrators, and staff. Like other elements of the IDM, the PD element has two types of indicators: those that are about infrastructure at the state level (6 indicators) and those about implementation at the local level (5 indicators). Infrastructure indicators cover state policy and requirements, supports, and data systems. Implementation indicators reveal whether systems are affordable, accessible, relevant, effective, and culturally responsive.

At the request of the Gates Foundation, Mathematica conducted a systematic literature review focused on PD. (The full methodology is in the appendix.) For the PD element, after screening the studies collected for the literature review, we identified and reviewed 55 studies published since 2001 to assess their quality and key findings (see References). For this element, 41 studies supported at least one IDM indicator.

Although high quality research for some PD indicators is only limited, we caution readers against drawing conclusions about the inherent value of the indicators. Readers should not conclude that a lack of high quality studies means that the indicator does not have valuable, nuanced information to offer about how to strengthen state systems.

> ### Definitions
>
> **Research strength** is based on the number of *high quality studies* with favorable effects on child or teacher outcomes.
> - High quality studies are those in which the design is strong enough to suggest that outcomes can be attributed to the intervention, practice, or policy that is being studied.
>
> **Practice strength** is based on whether the indicator is supported by professional best *practices or expert* recommendations.
> - Professional best practice standards include the Head Start Performance Program Standards (HSPPS) and the standards set forth by the National Association for the Education of Young Children (NAEYC).
> - Expert recommendations are from the National Academy of Sciences, Engineering, and Mathematics (NASEM). ◢

Because the IDM is a tool designed to improve state systems, we also determined which elements and indicators were supported by professional best practice standards and expert recommendations. (The box on the first page defines high quality, best practice standards, and expert recommendations; see the appendix for full definitions and a description of how we rated these dimensions to determine the overall research strength and practice strength of each IDM indicator.)

The IDM tool explicitly embeds equity into the indicators to ensure state leaders continue to value diverse groups of learners and teachers and provides high quality learning opportunities for all children. In our

literature review, we examined equity by describing and placing value on studies that include students and teachers with diverse characteristics. We have captured whether the samples in high quality studies with favorable effects include dual language learners (DLLs), children whose families have low incomes, and children and teachers of racially and ethnically diverse backgrounds. Research that explicitly addresses questions of equity is limited, however, despite its importance for state systems that serve children from disadvantaged backgrounds.

B. Details of support for indicators

In this section, we describe the extent to which indicators are supported by the research literature or the recommendations of professionals and experts. We give more details about the high-quality studies we identified that have favorable effects, the part(s) of the indicator that the study supported, and any themes in the results that concern outcomes of teachers and/or children. We report whether any studies are particularly relevant to a specific IDM indicator. We also report on whether the research speaks to equity; for example, whether studies were based on diverse samples or showed effects for certain groups of teachers or children. If there were no studies or professional/expert recommendations related to an indicator (see Figure 1), we do not discuss it.

IDM PD 1. The early childhood PD system includes research-based core knowledge and competencies that are equitable and easily accessible. PD providers are monitored to ensure they meet specific standards.

The PD system includes the following four essential criteria:

- **Founded on research-based core knowledge and competencies**

- **Equitable in its design and modes of delivery (i.e., PD materials are translated in languages representative of the field, PD opportunities take geographical barriers into account, content is inclusive of all children and families)**

- **Accessible (i.e., offered in diverse formats to meet the needs of the field - online, in person, accessible for early childhood educators with disabilities – Section 508 compliant)**

- **Monitoring of PD providers through a professional standards board, accreditation process, or other quality assurance mechanisms**

Practice Strength:

- Both sets of professional and expert recommendations partially support this indicator. Both sets supported that the idea that teacher preparation programs and professional development opportunities should focus on teachers meeting professional standards and competencies, but neither set of recommendations discussed the degree to which the PD system should be equitable or accessible. Both sets also do not discuss monitoring professional development providers.

IDM PD 2. State has requirements related to ongoing PD. The requirements are research-based. There are clear guidelines and incentives (e.g., points in a grant system, points in a quality rating and improvement system (QRIS) rating, PD credit, etc.) to support teachers, aides, and instructional leaders to engage in ongoing PD pre- and post-degree attainment. Incentives are equitable and are customized to meet the needs of individuals such as individual PD vs. group PD, frequency, PD hours, etc.

Practice Strength:

- Both sets of professional and expert recommendations partially support this indicator. Both sets value training and professional development that are designed to help staff acquire or increase the knowledge and skills they need to give young children high quality care. Neither the professional nor the expert recommendations commented on the value of incentives.

IDM PD 3. State provides ongoing, accessible, and equitably distributed resources, training, and funding to support the implementation of JEPL. Examples of ongoing, accessible, and equitably distributed resources include:

- **Written guidance, funding, technical assistance, training, coaching, consultation, on-the-job training, etc.**
- **Materials and tools that are accessible in languages that represent the field, are 508 compliant for early childhood educators with disabilities, and are delivered in various mediums.**

Funding may also support instructional leadership roles and JEPL.

- **Funding may cover one-time trainings, ongoing trainings, or pilots or innovations.**
- **Existing program funds may be used to cover costs.**

Practice Strength:

- Both professional and expert recommendations partially support this indicator. Professional recommendations support JEPL, and expert recommendations support that (a) policymakers support workforce development with coherent funding, oversight, and policies and (b) policymakers support comprehensive state- and local-level efforts to transform the professional workforce for children from birth through age 8, but does not name JEPL explicitly as a strategy to support workforce development. Neither speaks to how resources or funding should be distributed or provide detail as to how states are to provide JEPL supports to programs.

IDM PD 4. Degree requirements for teachers are appropriately rigorous and are integrated into a career lattice. There are supports for those of diverse backgrounds to attain further education credentials, and all four of the following characteristics or requirements are true:

- **All teachers are required to have an early childhood education credential (e.g., Child Development Associate (CDA), Associate of Arts (AA) in early childhood education).**
- **All teachers are required to have a bachelor's degree.[1]**

---

[1] There is a separate literature which examines to what extent specific degrees lead to improved child outcomes. Our search did not examine this literature.

- **A formal career lattice outlines how different types and levels of educational attainment and years of experience can lead early childhood educators to new roles and opportunities.**
- **State-funded supports are established for those with diverse racial, lingual, and socioeconomic backgrounds to attain higher levels of early childhood education credentials.**

Practice Strength:

- The professional recommendations partially support this indicator, whereas the expert recommendations fully support this indicator. The HSPPS requires programs to hire staff who have the required qualifications. Specifically, the HSPPS requires that 50 percent of all Head Start center-based teachers have a baccalaureate degree in child development or early childhood education, or equivalent coursework. A program must ensure all center-based teachers have at least an associate's or bachelor's degree in child development or early childhood education, or equivalent coursework; and a program must ensure Head Start assistant teachers have, at a minimum, a CDA credential or a state-awarded certificate that meets or exceeds the requirements for a CDA credential, are enrolled in a program that will lead to an associate or baccalaureate degree, or are enrolled in a CDA credential program to be completed within two years of the time of hire. Head Start also encourages programs to develop career development plans that outline the training, qualifications and credentials staff must demonstrate at various levels of professional responsibility. NAEYC addresses the value of professional preparation programs and argues that early childhood educator programs that train future ECE teachers must prepare and require candidates to meet standards and competencies. Neither HSPPS or NAEYC discuss making the support and attainment of educational credentials accessible to those of diverse backgrounds. The NASEM recommends that all lead teachers have a minimum of a B.A., and that there are multiple pathways to support that degree requirement. NASEM also recommends that strategies need to include a diverse group of early childhood education professionals.

IDM PD 5. State collects JEPL data on early learning professionals' race, income, and language; data are gathered and used in the following five ways:

- **State collects data using tracking tools, program evaluation tools, early childhood educator surveys, and local level reports.**
- **State verifies the implementation of JEPL through monitoring, use of an online platform, or directly collecting early childhood educator surveys.**
- **State uses JEPL data for accountability and improvement.**
- **A quality assurance mechanism monitors the quality of JEPL provided to teachers and instructional leaders.**
- **State uses multiple sources of data to inform improvement plans and track progress and uses the data to guide technical assistance and resources to local programs.**

Practice Strength:

- The professional and expert recommendations partially support this indicator, naming some but not all of the five ways data should be gathered and used. The Office of Head Start requires programs to track information about staff qualifications as part of the annual Program Information Report (PIR). Although it is not explicitly about professional development, the HSPPS requires that programs use

data to identify their strengths and needs and develop and implement plans to address their goals. The NASEM recommends that state and municipal governments establish data systems and collect information on demographics, education, qualifications, experience, income, and participation in professional learning.

IDM PD 6. The state's efforts to understand and address inequity with regard to policies and practices around early learning core knowledge and PD standards, ongoing PD requirements and incentives, job-embedded PD standards and resources, and workforce development includes ongoing data collection, disaggregation of data, active discussions, data-driven decision-making, action planning, implementing, assessing implementation, and refining as needed.

The state specifically collects data to understand and address the following four components:

- **The barriers to accessing affordable PD opportunities (access includes location of available PD, language, 508 compliance, and diversity of trainers).**

- **The need for PD opportunities that reflect teachers' or providers' diversity, and include voices and experiences of diverse teachers and providers.**

- **The need for PD content that is comprehensive and meets the needs of all teachers (i.e., content is varied and supports teachers to engage with children from all backgrounds).**

- **Demographic differences in degree or credential attainment, and challenges to career advancement especially for populations of color, low-income, and dual language learners.**

Practice Strength:

- Both the professional and expert recommendations partially support this indicator. Both support the idea that programs, states, and municipal governments collect data, but not all four components are identified in either set of recommendations.

IDM PD 7. Teachers receive job-embedded professional learning.

Research Strength:

- Thirty-nine studies on JEPL for teachers reported favorable effects on a range of child, teacher, or classroom outcomes. The studies examined a wide range of approaches to JEPL. Most of the studies examined intensive coaching models, with eight studies examining a version of My Teaching Partner, and the remainder examining a range of other coaching models. Many of these interventions combined coaching with either in-person or virtual coursework, workshops, training, or materials. In many cases, the coaching or training was incorporated as part of a new curriculum or classroom instructional component. Together, they showed that JEPL interventions covering a wide range of teaching domains—including academic instruction in language, literacy, or math; behavior or classroom management approaches; and approaches that facilitate supportive teacher-child interactions and teacher responsiveness to children—improved a variety of child, teacher, or classroom-level outcomes.

- Nearly all of the study samples are diverse. Most studies represent programs with high concentrations (at least 75 percent) of low-income students (30 of 39 studies), racial/ethnic minority children (26 studies), or racial/ethnic minority teachers (23 studies). Dual-language learners were represented in 7 studies. In one of these, for example, the professional development program was designed to support

teachers in promoting the school readiness of prekindergarten dual-language (English and Spanish) learners.

Practice Strength:

- Both the professional recommendations and the expert recommendations support this indicator. Both sets support the value of JEPL and suggest programs should provide coaching and mentoring to staff to advance staff's understanding, knowledge, and skills.

IDM PD 8. Regional and local instructional leaders report receiving training and ongoing support in instructional leadership practices, including the following:

- **Leading data informed continuous quality improvement (CQI) processes**
- **Organizing and facilitating job-embedded professional learning**
- **Ensuring coherent instructional guidance and systems to support teacher practice**
- **Creating systems and support for family engagement practices**
- **Including teachers and families in decision making**
- **Addressing and ensuring equity**
- **Building a trusting and supportive environment among all in the program community.**

Practice Strength:

- The professional and expert recommendations do not support this indicator. Although both HSPSS and NASEM acknowledge the role of instructional leaders, the specific types of training and ongoing supports for leaders identified in the IDM are not identified in the recommendations.

IDM PD 9. Professional development opportunities are affordable and accessible.

Research Strength:

- Thirteen studies examined supports delivered to teachers that were provided at scale across the state or delivered through light-touch methods such as online platforms, which could be affordable for states and programs. These studies support the concept that providing teachers with affordable and accessible professional development has favorable effects on both teachers and children. However, some of these programs had other components, so it is hard to disentangle the specific effects of the affordability and accessibility aspects.

Practice Strength:

- Both the professional recommendations and the expert recommendations highlight the need to make training affordable and accessible for staff by providing and funding it.

IDM PD 10. Professional development opportunities are culturally and linguistically responsive to the needs of early childhood educators.

Research Strength:

- One study examined the impact of Nuestros Niños School Readiness, which delivered professional development to teachers over a two-year period via three-day institutes, eight months of monthly consultation from bilingual consultants, and twice-monthly professional learning communities.

- This study supports that linguistically responsive PD can improve children's math, writing, receptive and expressive vocabulary skills, and social-emotional development. It can improve teachers' instructional support, practices to support dual language learners' language and literacy development, and quality of language interactions in Spanish and in English. However, this study did not explicitly discuss culturally responsive PD.

Practice Strength:

- The professional recommendations support that professional preparation programs should work to ensure they reflect principles of equity and diversity throughout all aspects of their curricula. The expert recommendations do not address this topic.

IDM PD 11. PD opportunities support development of core competencies sought by both pre- and post-degree early childhood educators.

Practice Strength:

- The professional and expert recommendations support this indicator. NAEYC notes that professional preparation programs should be aligned with competencies and standards. HSPPS notes that a program must ensure that teachers and assistant teachers demonstrate competencies. The expert recommendations note that programs should strengthen competency-based qualification requirements for all care and education professionals working with children from birth through age 8.

C. Overall ratings of research and practice support for indicators

Figures 1 and 2 summarize the overall strength of the research and practice support for each PD indicator.

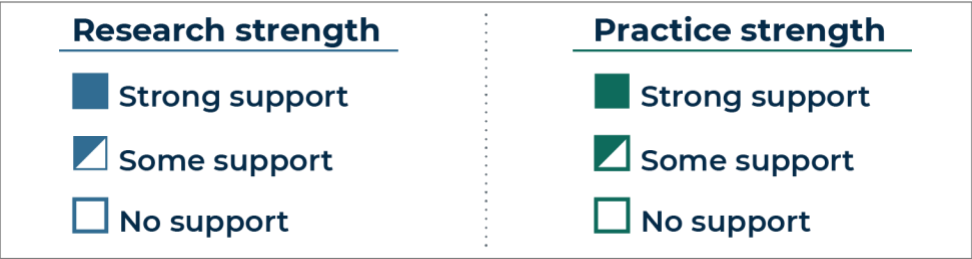**Figure 1. Indicator key for overall ratings of research and practice strength**

Figure 2. Overall ratings of research and practice strength

Professional Development	Research strength	Practice strength
1 Core Knowledge and PD Standards	☐	◪
2 Ongoing PD: Requirements and Incentives	☐	◪
3 Job-Embedded Resources	☐	◪
4 Workforce Development	☐	◪
5 PD Data Collection and Data Use	☐	◪
6 PD Data Collection for Equity Goals	☐	◪
7 Prevalence of Job-Embedded PD	◼	◼
8 Instructional Leadership Supports	☐	☐
9 Affordability and Accessibility	◼	◼
10 Cultural and Linguistic Responsiveness	◪	◪
11 Relevance and Effectiveness	☐	◼

D. Detailed ratings of research and practice support for indicators

Figures 3 and 4 give additional detail on the research and practice support for each IDM indicator.

Figure 3. Indicator key for detailed ratings of research and practice strength

▸**Research Strength**

	1	2	3	4

Number of high quality studies

High quality studies provide rigorous causal evidence

High quality studies show improved teacher outcomes

High quality studies show improved child outcomes

High quality studies that show improved teacher or child outcomes have diverse samples

▸**Practice Strength**

Supported by professional best practices

Criteria met?
■ Yes   ☐ No   ◨ Partially

Supported by expert recommendations

Criteria met?
■ Yes   ☐ No   ◨ Partially

Figure 4. Detailed ratings of research and practice strength

Professional Development	Research strength	Practice strength
1 Core Knowledge and PD Standards		
2 Ongoing PD: Requirements and Incentives		
3 Job-Embedded Resources		
4 Workforce Development		
5 PD Data Collection and Data Use		
6 PD Data Collection for Equity Goals		
7 Prevalence of Job-Embedded PD		
8 Instructional Leadership Supports		
9 Affordability and Accessibility		
10 Cultural and Linguistic Responsiveness		
11 Relevance and Effectiveness		

Appendix

A.   Identifying literature

Mathematica staff reviewed the literature on the use of research-based curriculum in preschool classrooms. We worked with our professional librarians to develop targeted search terms. We then searched eight databases for published articles.[2] Using the information in the abstracts, we screened out studies that did not meet our inclusion criteria. All eligible studies had to meet the following criteria:

- Based in the United States

- Focused on children ages 3 to 5

- Implemented in a prekindergarten setting (Head Start, child care center, or state prekindergarten program)

- Evaluated child or teacher/classroom outcomes using a randomized controlled trial, quasi-experimental, or correlational design

- Published in 2001 or later

We procured the full text of the eligible studies. Next, we screened the studies again to identify whether the studies mapped to any of the Implementation Development Map (IDM) indicators and to confirm that the studies met our inclusion criteria[3]. We screened out any studies that did not focus on an IDM indicator (Table A.1). For the PD element, after examining the full texts of the 140 studies initially identified, 55 met the inclusion criteria, 45 were rated high quality, and 41 of the high quality studies had at least one favorable outcome (see the reference list for the high quality studies).

Table A.1. Number of studies identified, reviewed, and found to support the PD element

IDM element	Studies identified	Studies fully reviewed	High quality studies	High quality studies with favorable outcomes
Professional development	140	55	45	41

B.   Assessing support for IDM indicators

We assessed each indicator on seven dimensions (Tables A.4 and A.5) to summarize the support for the indicator in the research and professional/expert recommendations.

To identify high quality studies, reviewers rated the rigor of the study design (Dimensions 1 and 2). To identify whether the studies show an improvement in outcomes, reviewers summarized the study impacts on children or teachers (Dimensions 3 and 4). To identify the extent to which high quality studies provided evidence of improvements with diverse groups of children and teachers, reviewers examined the groups of children and teachers included in the studies (Dimension 5). To determine the extent to which professional best practices and expert recommendations supported the indicators, we reviewed key practice documents (Dimensions 6 and 7). Below, we describe each step.

---

[2] The eight databases are Academic Search Premier, APA PsycInfo, Cochrane Database of Systematic Reviews, Education Research Complete, ERIC, ProQuest Dissertations, SAGE Journals, and Scopus.

[3] We excluded studies that trained teachers on specific behavior modification or classroom management techniques.

1. Rating study quality

We wanted to identify studies with results we could be confident were valid. We categorized studies as those that provide rigorous causal evidence, strong evidence, or low quality evidence (Table A.2).

Table A.2. Study quality ratings

Study rating	Description
Provides rigorous causal evidence[a]	Well-conducted randomized controlled trials with limited attrition (< 20 percent) and no other design concerns provide the strongest evidence because outcomes can be attributed to the intervention, practice, or policy rather than to existing differences between groups.
Provides strong evidence[a]	Studies that show that their comparison groups are similar or include relevant control variables suggest that outcomes can be attributed to the intervention, practice, or policy but that unmeasured differences might exist between groups.
	These studies could include randomized controlled trials with high attrition or quasi-experimental designs that (a) show that the comparison groups used in analysis were equivalent on demographics and a baseline measure of the outcome (or another outcome in the same domain) or (b) controls for demographics and baseline measures. These studies could also include correlational designs and ones that have a comparison group but no baseline measures, provided they use a strong set of relevant controls (including demographics and other characteristics that could influence the outcome).
Provides low quality evidence	These are studies with unconvincing results. These studies could include randomized controlled trials with high attrition, quasi-experimental designs, or correlational studies that do not use adequate control variables or that have a confound such as using different data collection methods in the treatment and comparison groups.

[a] Both of these ratings were considered to provide high quality evidence.

We then summarized the number of high quality studies—studies that provide rigorous causal evidence and strong evidence—and the percentage of high quality studies that provide rigorous causal evidence for each indicator. Studies can support several indicators.

2. Rating study findings

We categorized whether the high quality studies had statistically significant effects on any child or teacher/classroom outcomes included in the studies (Table A.3).

Table A.3. Definitions of study impacts

Study impacts	Definition
Favorable	Significant effects on at least one outcome that benefits children or teachers/classrooms; for example, improving classroom quality
Unfavorable	Significant negative effects on at least one outcome for children or teachers/classrooms and no favorable effects on any outcomes; for example, children's receptive vocabulary scores decrease
No effect	No significant effects on any child or teacher/classroom outcomes
Mixed	At least one favorable and unfavorable effect

We next summarized for each indicator the percentage of high quality studies with favorable effects on children, teachers/classrooms, or both.

3. Rating whether studies include diverse samples

For high quality studies with favorable effects on children and teachers/classrooms, we examined whether the studies included different population groups. We assessed whether studies reported that they included the following:

- Racially/ethnically diverse children (at least 25 percent of children are Hispanic, African American, or American Indian/Alaska Native)

- Racially/ethnically diverse teachers (at least 25 percent of teachers are Hispanic, African American, or American Indian/Alaska Native)

- Children who are dual language learners (DLLs) (at least 25 percent of children are DLLs)

- Children from low-income households (at least 75 percent of children are in low-income households or the educational setting is low income)

We then looked at whether each indicator has high quality studies with favorable effects with racially/ethnically diverse children, racially/ethnically diverse teachers, DLLs, and children from low-income households.

4. Assessing professional best practices and expert recommendations

Because the IDM is a tool designed to improve state systems, we determined which elements and indicators were supported by professional best practice standards, including the Head Start Performance Program Standards, the standards set by the National Association for the Education of Young Children, and expert recommendations from the National Academy of Sciences, Engineering, and Mathematics. The latter organization analyzes available evidence to advance the learning and development of children, youth, and families and presents consensus recommendations that undergo peer review before publication peer reviewed before publication.[4]

A team of researchers reviewed IDM indicators to determine how well they aligned or agreed with these professional standards. We assessed whether each indicator was supported by professional recommendations and expert recommendations by using a three-part scale that included "met," "partially met," or "not met." We used "partially met" when aspects of the indicator were supported, but not necessarily when the full indicator was met, because each indicator often covers several ideas.

5. Assigning overall ratings on dimensions

Based on the rating of study quality, study findings, the diversity of samples, and professional and expert recommendations, we rated each indicator on seven dimensions (Table A.4 and Table A.5). Ratings for the research support dimensions ranged from 1 to 4; ratings for the recommendation support dimensions included met, partially met, and not met.

---

[4] These documents included the HSPPS as found online: https://eclkc.ohs.acf.hhs.gov/policy/45-cfr-chap-xiii as well as the National Association for the Education of Young Children (NAEYC), "Professional Standards and Competencies for Early Childhood Educators" (Washington, DC: NAEYC, November 2019); NAEYC, "Developmentally Appropriate Practice" (Washington, DC: NAEYC, April 2020); NAEYC, "Advancing Equity in Early Childhood Education" (Washington, DC: NAEYC, April 2019); and National Research Council, "Transforming the Workforce for Children Birth Through Age 8: A Unifying Foundation" (Washington, DC: National Academies Press, 2015).

Table A.4. Definitions of dimension ratings for research support

Research support dimension	1	2	3	4
Number of high quality studies	1 to 3 high quality studies	4 to 6 high quality studies	7 to 9 high quality studies	10 or more high quality studies
High quality studies that provide rigorous causal evidence	1–25% of high quality studies provide causal evidence	26–50% of high quality studies provide causal evidence	51–75% of high quality studies provide causal evidence	76–100% of high quality studies provide causal evidence
High quality studies that show improved teacher/classroom outcomes (show at least one favorable effect on a teacher outcome and no unfavorable effects)	1–25% of high quality studies show improved teacher/classroom outcomes	26–50% of high quality studies show improved teacher/classroom outcomes	51–75% of high quality studies show improved teacher/classroom outcomes	76–100% of high quality studies show improved teacher/classroom outcomes
High quality studies that show improved child outcomes (show at least one favorable effect on a child outcome and no unfavorable effects)	1–25% of high quality studies show improved child outcomes	26–50% of high quality studies show improved child outcomes	51–75% of high quality studies show improved child outcomes	76–100% of high quality studies show improved child outcomes
High quality studies that show improved teacher or child outcomes with diverse samples	Studies include one of the following groups: racially/ethnically diverse children, racially/ethnically diverse teachers, DLLs, children from low-income households	Studies include two of the following groups: racially/ethnically diverse children, racially/ethnically diverse teachers, DLLs, children from low-income households	Studies include three of the following groups: racially/ethnically diverse children, racially/ethnically diverse teachers, DLLs, children from low-income households	Studies include four of the following groups: racially/ethnically diverse children, racially/ethnically diverse teachers, DLLs, children from low-income households

DLLs = dual language learners.

Table A.5. Definitions of dimension ratings for practice support

Practice support dimension	Not met	Partially met	Met
Supported by professional best practices	The indicator was not supported by the HSPPS or NAEYC	Part of the indicator was supported by the HSPPS or NAEYC	The full indicator was supported by the HSPPS or NAEYC
Supported by expert recommendations	The indicator was not supported by NASEM	Part of the indicator was supported by NASEM	The full indicator was supported by NASEM

NAEYC = National Association for the Education of Young Children; NASEM = National Academies of Sciences, Engineering, and Medicine; HSPPS = Head Start Program Performance Standards.

6. Assigning overall ratings on research and practice strength

To make the recommendation support rating even more accessible, we summarized two dimensions of support: research strength and practice strength (Table A.6).

Table A.6. Definitions of research and practice strength ratings

Recommendation support dimension	No support	Some support	Full support
Research strength (number of high quality studies with favorable effects on child or teacher/classroom outcomes)	No high quality studies show improved child or teacher/classroom outcomes	One or two high quality studies show improved child or teacher/classroom outcomes	Three or more high quality studies show improved child or teacher/classroom outcomes
Practice strength (whether supported by professional best practices or expert recommendations)	Neither professional best practices nor expert recommendations support the indicator	At least one set of professional best practices or expert recommendations partially supports the indicator, or only one (and not both) set fully supports the indicator	Both professional best practices AND expert recommendations support the indicator

References

Ansari, A., & Pianta, R. C. (2018). Effects of an early childhood educator coaching intervention on preschoolers: The role of classroom age composition. *Early Childhood Research Quarterly, 44*, 101-113.

Breffni, L. (2011). Impact of curriculum training on state-funded prekindergarten teachers' knowledge, beliefs, and practices. *Journal of Early Childhood Teacher Education, 32*(2), 176-193.

Byington, T. A., & Kim, Y. (2020). Impact of a language and literacy training and coaching intervention on early childhood outcomes in low-income communities. *Journal of Extension, 58*(4), art V56-4rb1

Castro, D. C., Gillanders, C., Franco, X., Bryant, D. M., Zepeda, M., Willoughby, M. T., et al. (2017). Early education of dual language learners: An efficacy study of the Nuestros Niños school readiness professional development program. *Early Childhood Research Quarterly, 40*, 188–203. doi:10.1016/j.ecresq.2017.03.002

Clements, D. H., Sarama, J., Mary, E. S., Lange, A. A., & Wolfe, C. B. (2011). Mathematics learned by young children in an intervention based on learning trajectories: A large-scale cluster randomized trial. *Journal for Research in Mathematics Education, 42*(2), 127–166.

Domitrovich, C. E., Gest, S. D., Gill, S., Bierman, K. L., Welsh, J. A., & Jones, D. (2009). Fostering high-quality teaching with an enriched curriculum and professional development support: The Head Start REDI program. *American Educational Research Journal, 46*(2), 567–597.

Downer, J. T., Pianta, R. C., Fan, X., Hamre, B. K., Mashburn, A., & Justice, L. (2011). Effects of web-mediated teacher professional development on the language and literacy skills of children enrolled in prekindergarten programs. *NHSA Dialog, 14*(4), 189–212.

Early, D. M., Maxwell, K. L., Ponder, B. D., & Pan, Y. (2017). Improving teacher-child interactions: A randomized controlled trial of making the most of classroom interactions and My Teaching Partner professional development models. *Early Childhood Research Quarterly, 38*, 57–70.

Fabiano, G. A., Vujnovic, R. K., Waschbusch, D. A., Yu, J., Mashtare, T., Pariseau, M. E., et al. (2013). A comparison of workshop training versus intensive, experiential training for improving behavior support skills in early educators. *Early Childhood Research Quarterly, 28*(2), 450–460.

Feil, E. G., Walker, H., Severson, H., Golly, A., Seeley, J. R., & Small, J. W. (2009). Using positive behavior support procedures in Head Start classrooms to improve school readiness: A group training and behavioral coaching model. *NHSA Dialog, 12*(2), 88–103.

Gettinger, M., & Stoiber, K. C. (2016). Coaching and demonstration of evidence-based book-reading practices: Effects on Head Start teachers' literacy-related behaviors and classroom environment. *Journal of Early Childhood Teacher Education, 37*(2), 117–141.

Gropen, J., Kook, J. F., Hoisington, C., & Clark-Chiarelli, N. (2017). Foundations of science literacy: Efficacy of a preschool professional development program in science on classroom instruction, teachers' pedagogical content knowledge, and children's observations and predictions. *Early Education & Development, 28*(5), 607–631.

Hamre, B. K., Pianta, R. C., Burchinal, M., Field, S., LoCasale-Crouch, J., Downer, J. T., et al. (2012a). A course on effective teacher-child interactions: Effects on teacher beliefs, knowledge, and observed practice. *American Educational Research Journal, 49*(1), 88–123.

Hamre, B., Pianta, R., Mashburn, A., & Downer, J. (2012b). Promoting young children's social competence through the preschool PATHS curriculum and MyTeachingPartner professional development resources. *Early Education & Development, 23*(6), 809–832.

Hanno, E. C., & Gonzalez, K. E. (2020). The effects of teacher professional development on children's attendance in preschool. *Journal of Research on Educational Effectiveness, 13*(1), 3–28.

Harding, J. F., Connors, M. C., Krauss, A. F., Aikens, N., Malone, L., & Tarullo, L. (2019). Head Start teachers' professional development, well-being, attitudes, and practices: Understanding changes over time and predictive associations. *American Journal of Community Psychology, 63*(3), 324–337.

Hemmeter, M. L., Snyder, P. A., Fox, L., & Algina, J. (2016). Evaluating the implementation of the pyramid model for promoting social-emotional competence in early childhood classrooms. *Topics in Early Childhood Special Education, 36*(3), 133–146.

Hindman, A. H., & Wasik, B. A. (2011). Exploring Head Start teachers' early language and literacy knowledge: Lessons from the ExCELL professional development intervention. *NHSA Dialog, 14*(4), 293–315.

Hindman, A., Erhart, A., & Wasik, B. (2012). Reducing the Matthew effect: Lessons from the ExCELL Head Start intervention. *Early Education & Development, 23*(5), 781–806.

Jackson, B., Larzelere, R., St. Clair, L., Corr, M., Fichter, C., & Egertson, H. (2006). The impact of HeadsUp! reading on early childhood educators' literacy practices and preschool children's literacy skills. *Early Childhood Research Quarterly, 21*(2), 213–226.

Jackson, R., McCoy, A., Pistorino, C., Wilkinson, A., Burghardt, J., Clark, M., et al. (2007). *National evaluation of early reading first: Final report to congress.* NCEE 2007-4007. National Center for Education Evaluation and Regional Assistance. Available from ED Pubs. P.O. Box 1398, Jessup, MD 20794-1398.

Johnson, S. R., Finlon, K. J., Kobak, R., & Izard, C. E. (2017). Promoting student–teacher interactions: Exploring a peer coaching model for teachers in a preschool setting. *Early Childhood Education Journal, 45*(4), 461–470.

Kermani, H., & Aldemir, J. (2015). Preparing children for success: Integrating science, math, and technology in early childhood classroom. *Early Child Development & Care, 185*(9), 15041527.

Kinzie, M. B., Whittaker, J. V., Williford, A. P., DeCoster, J., McGuire, P., Lee, Y., et al. (2014). MyTeachingPartner-Math/Science pre-kindergarten curricula and teacher supports: Associations with children's mathematics and science learning. *Early Childhood Research Quarterly*, 29(4), 586–599. doi:10.1016/j.ecresq.2014.06.007

Knight, D. S., Landry, S., Zucker, T. A., Merz, E. C., Guttentag, C. L., & Taylor, H. B. (2019). Cost-effectiveness of early childhood interventions to enhance preschool: Evidence from a randomized experiment in Head Start centers enrolling historically underserved populations. *Journal of Policy Analysis & Management, 38*(4), 891–917.

Landry, S. H., Swank, P. R., Smith, K. E., Assel, M. A., & Gunnewig, S. B. (2006). Enhancing early literacy skills for preschool children: Bringing a professional development model to scale. *Journal of Learning Disabilities, 39*(4), 306–324.

Landry, S. H., Anthony, J. L., Swank, P. R., & Monseque-Bailey, P. (2009). Effectiveness of comprehensive professional development for teachers of at-risk preschoolers. *Journal of Educational Psychology, 101*(2), 448–465.

Landry, S., Swank, P., Anthony, J., & Assel, M. (2011). An experimental study evaluating professional development activities within a state funded pre-kindergarten program. *Reading & Writing, 24*(8), 971–1010.

Mashburn, A., Downer, J., Hamre, B., Justice, L., & Pianta, R. (2010). Consultation for teachers and children's language and literacy development during pre-kindergarten. *Applied Developmental Science, 14*(4), 179–196.

Moreno, A., Green, S., & Koehn, J. (2015). The effectiveness of coursework and onsite coaching at improving the quality of care in infant–toddler settings. *Early Education & Development, 26*(1), 66–88.

Pianta, R., Hamre, B., Downer, J., Burchinal, M., Williford, A., LoCasale-Crouch, J., et al. (2018). Early childhood professional development: Coaching and coursework effects on indicators of children's school readiness: Corrigendum. *Early Education and Development, 29*(8), 1134.

Piasta, S. B., Farley, K. S., Mauck, S. A., Soto Ramirez, P., Schachter, R. E., O'Connell, A. A., et al. (2020). At-scale, state-sponsored language and literacy professional development: Impacts on early childhood classroom practices and children's outcomes. *Journal of Educational Psychology, 112*(2), 329–343.

Powell, D. R., Diamond, K. E., Burchinal, M. R., & Koehler, M. J. (2010). Effects of an early literacy professional development intervention on Head Start teachers and children. *Journal of Educational Psychology, 102*(2), 299–312.

Roberts, A. M., LoCasale-Crouch, J., Hamre, B. K., & Jamil, F. M. (2020). Preschool teachers' self-efficacy, burnout, and stress in online professional development: A mixed methods approach to understand change. *Journal of Early Childhood Teacher Education, 41*(3), 262–283.

Rosenfeld, D., Dominguez, X., Llorente, C., Pasnik, S., Moorthy, S., Hupert, N., et al. (2019). A curriculum supplement that integrates transmedia to promote early math learning: A randomized controlled trial of a PBS KIDS intervention. *Early Childhood Research Quarterly, 49*, 241–253.

Schwanenflugel, P. J., Hamilton, C. E., Neuharth-Pritchett, S., Restrepo, M. A., Bradley, B. A., & Webb, M. (2010). PAVEd for success: An evaluation of a comprehensive preliteracy program for four-year-old children. *Journal of Literacy Research, 42*(3), 227–275.

Solari, E. J., Zucker, T. A., Landry, S. H., & Williams, J. M. (2016). Relative effects of a comprehensive versus reduced training for Head Start teachers who serve Spanish-speaking English learners. *Early Education & Development, 27*(7), 1060–1076.

Son, S. C., Kwon, K., Jeon, H., & Hong, S. (2013). Head Start classrooms and children's school readiness benefit from teachers' qualifications and ongoing training. *Child & Youth Care Forum, 42*(6), 525–553.

Wasik, B. A., & Hindman, A. H. (2011). Improving vocabulary and pre-literacy skills of at-risk preschoolers through teacher professional development. *Journal of Educational Psychology, 103*(2), 455–469.

Wasik, B. A., & Hindman, A. H. (2020). Increasing preschoolers' vocabulary development through a streamlined teacher professional development intervention. *Early Childhood Research Quarterly, 50*, 101–113. doi:10.1016/j.ecresq.2018.11.001

Wasik, B. A., Bond, M. A., & Hindman, A. (2006). The effects of a language and literacy intervention on Head Start children and teachers. *Journal of Educational Psychology, 98*(1), 63–74.

Whalen, S. P., Horsley, H. L., Parkinson, K. K., & Pacchiano, D. (2016). A development evaluation study of a professional development initiative to strengthen organizational conditions in early education settings. *Journal of Applied Research on Children, 7*(2), 1–43.

Whittaker, J.V., Kinzie, M. B., Williford, A., & DeCoster, J. (2016). Effects of MyTeachingPartner–Math/Science on Teacher–Child interactions in prekindergarten classrooms. *Early Education & Development, 27*(1), 110–127.

Whittaker, J. V., Kinzie, M. B., Vitiello, V., DeCoster, J., Mulcahy, C., & Barton, E. A. (2020). Impacts of an early childhood mathematics and science intervention on teaching practices and child outcomes. *Journal of Research on Educational Effectiveness, 13*(2), 177–212.

Wilson, S. J., Dickinson, D. K., & Rowe, D. W. (2013). Impact of an early reading first program on the language and literacy achievement of children from diverse language backgrounds. *Early Childhood Research Quarterly, 28*(3), 578–592. doi:10.1016/j.ecresq.2013.03.006