Infants & Young Children
Vol. 28, No. 3, pp. 210–219

Improving the Design and Implementation of In-Service Professional Development in Early Childhood Intervention

Carl J. Dunst, PhD

A model for designing and implementing evidence-based in-service professional development in early childhood intervention as well as the key features of the model are described. The key features include professional development specialist (PDS) description and demonstration of an intervention practice, active and authentic job-embedded practitioner opportunities to learn to use the practice, opportunities for practitioner reflection on the understanding and mastery of the practice, PDS coaching, mentoring, or performance feedback during in-service sessions, PDS follow-up supports to reinforce initial practitioner in-service learning, in-service training and follow-up of sufficient dosage to produce sustainable change, and the inclusion of as many key features as possible as part of the provision of in-service training afforded early childhood practitioners. The need for systematic reviews and meta-analysis of early childhood in-service professional development studies is noted to identify which key features in which combinations under which conditions are most effective. **Key words:** *early childhood intervention, in-service professional development, in-service training, key model features, professional development model, research evidence*

Unlike many fields that have a history of steady improvement built on a continually expanding knowledge base, professional learning for educators has a mixed history at best. Some critics argue that [professional development] lacks a strong evidence base [because] of a general absence of purpose. Others . . . argue that the research community has failed to offer useful guidelines for "best practice" for . . . improving the quality and effectiveness of professional learning activities.

Guskey (2014, p. 10)

ALTHOUGH Guskey (2014) made these comments with regard to teacher professional development in elementary and secondary schools, his remarks apply no less to in-service professional development in early childhood intervention (early intervention and preschool special education) and to professionals other than teachers and educators.

The purpose of this article is to describe an approach to in-service professional development based on existing models of in-service training and the key practice features of the models (Desimone, 2009; Guskey, 2002b), literature reviews of the features of in-service professional development used in early childhood intervention studies (Snell, Forston, Stanton-Chapman, & Walker, 2013; Snyder et al., 2012), and research evidence for the hypothesized relationships between the key features of in-service professional development and the outcomes of in-service learning opportunities (e.g., Cavanaugh, 2013; Fukkink & Lont, 2007; Isner et al., 2011; Zaslow, 2014). The material, together, is intended to be used to guide the design and

Author Affiliation: *Orelena Hawks Puckett Institute, Morganton, North Carolina.*

The author declares no conflict of interest.

Correspondence: *Carl J. Dunst, PhD, Orelena Hawks Puckett Institute, 128 S Sterling St, Morganton, NC 28655 (cjd@puckett.org).*

DOI: 10.1097/IYC.0000000000000042

implementation of evidence-based in-service training to promote or improve early childhood practitioners' adoption and use of evidence-based intervention practices (Dunst & Trivette, 2012; Trivette & Dunst, 2013). The term "evidence-based" is used broadly to mean a practice that has been empirically established as effective by research evidence establishing a statistical or functional relationship between the characteristics of a practice and the expected outcomes or consequences that the practices are intended to have (Dunst & Trivette, 2009b; Dunst, Trivette, & Cutspec, 2007).

The proposed framework and supporting evidence are situated in implementation science where in-service professional development is conceptualized as an implementation practice and the methods and strategies that early childhood practitioners learn and use as a result of in-service training are conceptualized as intervention practices (Dunst, Trivette, & Raab, 2013; Fixsen, Naoom, Blase, Friedman, & Wallace, 2005).

The research and practice described in this article were completed as part of the work scope of *The Early Childhood Personnel Center* (www.ecpcta.org) that includes the preparation of in-service professional development methods and strategies to improve the confidence and competence of practitioners in IDEA Part C Infant and Toddler Programs, IDEA Part B(619) preschool special education programs, and those working in other types of early childhood programs. The goal was to identify evidence-based professional development practices that incorporate a variety of adult learning strategies including job-embedded (practitioner learning opportunities) and coaching, reflective supervision, and supported mentoring.

A PROPOSED MODEL OF IN-SERVICE PROFESSIONAL DEVELOPMENT

Both Desimone (2009, 2011) and Guskey (1985, 2002b) have developed models for planning and conducting in-service professional development and investigating the manner in which the use of key features of in-service training is related to improved teacher and educator outcomes. The two models include similar elements: key features of professional development; changes and improvements in practitioner knowledge and skills; changes and improvements in practitioner adoption and use of instructional, behavioral, or other intervention practices; changes and improvements in student learning and other outcomes; and changes and improvements in practitioner attitudes and beliefs about the efficacy of their use of intervention practices and the effects on student learning. The foundations of both the Desimone (2009) and Guskey (2002b) models are key features of in-service professional development informed by the results of in-service professional development studies.

Figure 1 shows an in-service professional development model based on the research and practice of Desimone (2009), Guskey (2002b), and others (e.g., Browder et al., 2012; Dunst & Trivette, 2009a; Gall & Vojtek, 1994) framed in terms of early childhood intervention (both early intervention and preschool special education) and which is applicable to promoting practitioner use of any type of early childhood intervention practice. The foundations of the model are the evidence-based features of in-service professional development identified by researchers investigating the relationships between the key features and practitioner, student, child, or family outcomes.

The use of the key features as part of the design and conduct of in-service professional development is expected to result in changes in practitioner understanding of the key characteristics of the intervention practice(s) constituting the focus of in-service training and for promoting practitioner adoption and use of evidence-based early childhood intervention practices. The use of the practices, in turn, is expected to result in improvements and changes in child or family outcomes where observed positive consequence strengthen practitioners' attitudes and beliefs about the value and use of intervention practices

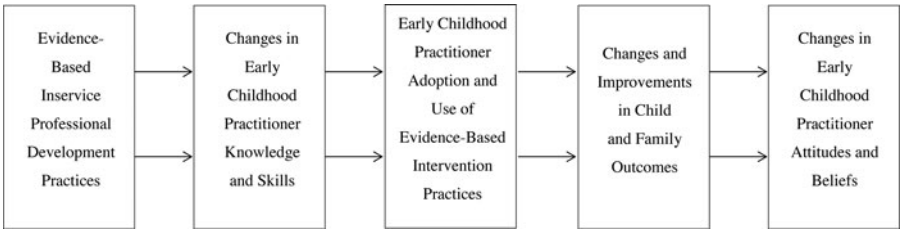

Figure 1. A model for conceptualizing, designing, and implementing in-service professional development to promote early childhood practitioner use of evidence-based early childhood intervention practices. From Desimone (2009, 2011) and Guskey (2002a, 2002b, 2014). Adapted with permission.

for affecting desired changes. The latter is especially important because "significant changes in the beliefs and attitudes of [practitioners] are contingent upon evidence of change in ... desired outcomes" (Guskey, 1985, p. 57), which reinforces practitioners continued use of the practice (Bandura, 1997).

KEY FEATURES OF THE EVIDENCE-INFORMED IN-SERVICE PROFESSIONAL DEVELOPMENT MODEL

Both the Desimone (2009) and Guskey (2002b) models, as well as similar models (e.g., Browder et al., 2012; Dunst & Trivette, 2009a; Gall & Vojtek, 1994), include a number of key features that have been found to be associated with either or both practitioner and student/child/family outcomes in both individual research studies (e.g., Landry, Anthony, Swank, & Monseque-Bailey, 2009; Neuman & Cunningham, 2009) and research syntheses of in-service professional development studies (e.g., Fukkink & Lont, 2007; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007; Zaslow et al., 2010). A review of these studies and syntheses with an eye on the key features that stand out as most important finds seven sets of practices consistently identified as important for in-service professional development to be effective.

The seven sets of features, taken together, provide a foundation for guiding the development and implementation of evidence-based in-service professional development where the relationships with practitioner and child or family outcomes shown in Figure 1 would be realized. The purpose here is not to describe the research evidence for all the linkages in the model but rather to highlight the key features identified by researchers as necessary for in-service professional development to be effective in terms of changes or improvements in practitioner outcomes, including, but not limited to, the knowledge and skills necessary to understand and use an early childhood intervention practice in a proficient manner.

The key features of evidence-based in-service professional development are as follows:

1. *Professional development specialists' explicit explanation and illustration of the specific content knowledge and practice to be learned* (Archibald, Coggshall, Croft, & Goe, 2011; Donovan, Bransford, & Pellegrino, 1999; Dunst & Trivette, 2009a; Garet, Porter, Desimone, Birman, & Yoon, 2001; Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009). This includes the methods used to introduce and describe the key characteristics of the practice constituting the focus of in-service professional development and the methods used to demonstrate or illustrate the use of the practice and its effects in terms of expected or desired outcomes. Guskey (2014) noted the importance of describing and demonstrating the manner in which desired student (child or family) outcomes are likely to be improved by the use of a practice constituting the focus of in-service training and why

learning to use the practice is better than alternative practices or business-as-usual. Desimone (2011) added that at this introductory stage of professional development, it is important to make it explicitly clear how a practice and its expected effects are aligned with professional development standards and policies.

2. *Active and authentic job-embedded practitioner opportunities to learn to use a practice and to engage in evaluation of their experiences* (Archibald et al., 2011; Bransford et al., 2000; Croft, Coggshall, Dolan, Powers, & Killion, 2010; Guskey, 2002a). This includes, but is not limited to, job-embedded (Croft et al., 2010) home-based or classroom-based use of a practice, simulated learning opportunities, learner-led descriptions of the use of a practice, and opportunities to be actively involved in as many of the in-service training activities as possible "as opposed to passively sitting through lectures" in workshops (Desimone, 2011, p. 69). As noted by Ericsson and Charness (1994), people in general and practitioners in particular develop expert performance by a "great amount of deliberate practice" (p. 740), which includes self-evaluation of the consequence of their use of knowledge, skills, or practice. In their review of research on how people learn, Bransford et al. (2000) found that expert and novice practitioners differ in terms of their planned and repeated use of different practice characteristics to determine which account for observed effects or desired outcomes to reinforce understanding and mastery.
3. *Explicit inclusion of different types of practices for engaging practitioners in reflection on their understanding and mastery of a practice* (Cahen & Superle, 2009; Capps, Crawford, & Constas, 2012; Garet et al., 2001; Hatton & Smith, 1995). This includes, but is not limited to, performance-based group discussions, collective participation, journaling, self-assessment of mastery against a set of performance standards, and practitioner–instructor reflective conversations. Especially important are opportunities for reflection on what worked and what needs improvement based on authentic job-embedded use of a practice. Of all of the key features of evidence-based in-service professional development, reflection is one feature that more often than not is omitted from practitioner in-service learning opportunities.
4. *Coaching, mentoring, or performance feedback by a professional development specialist during in-service training* (Ingersoll & Strong, 2011; Kretlow & Bartholomew, 2010; Leat, Lofthouse, & Wilcock, 2006; Onchwari & Keengwe, 2008). This includes in vivo observations of practitioners' use of a practice and performance feedback, coaching or mentoring sessions, instructor suggestions and feedback from videos of practitioners' use of a practice, and telephone, e-mail, or web-based suggestions and mentoring. To be effective, coaching, mentoring, performance feedback, or whatever term is preferred, involves a "method of transferring skills and expertise from more experienced and knowledgeable practitioners ... to less experienced ones" (Hargreaves & Dawe, 1990, p. 230) and is intended to provide practitioners a "means of examining and reflecting on what they do in a psychologically safe environment where it is alright to experiment, fail, revise, and try again" (Raney & Robbins, 1989, p. 37).
5. *Ongoing follow-up supports by professional development specialists, coaches, supervisors, peers, and so forth, to reinforce in-service learning sessions* (Blank & de las Alas, 2009; Capps et al., 2012; Ingersoll & Strong, 2011; Joyce & Showers, 2002; Kretlow & Bartholomew, 2010). The importance and necessity of continued supports have been noted by a number of investigators synthesizing available evidence for promoting the adoption and use of different types of intervention practices (e.g., Ingersoll & Strong, 2011; Yoon et al.,

2007). Kretlow and Bartholomew (2010) noted that coaching was most effective when it included "follow-up observations and specific feedback" (p. 292) of practitioners using the intervention practice that was the focus of in-service training. Joyce and Showers (2002) concluded their review of in-service professional development studies by stating that coaching was most effective when "it begins in training sessions and continues in the workplace following initial training" (p. 112). Follow-up is likely to be most effective when it is job-embedded where supports are provided in response to practitioner situated use of a practice (Rock, 2002; Streufert, 1985).

6. *In-service professional development of sufficient duration and intensity to provide multiple opportunities to become proficient in the use of a practice* (Dunst, Trivette, & Hamby, 2010; Ingersoll & Strong, 2011; Saylor & Johnson, 2014; Zaslow, 2014). According to Desimone (2011), professional development will likely be most effective when practitioner learning opportunities are distributed over time and include a sufficient number of contacts between professional development specialists and practitioners. Results from a number of research syntheses indicate, depending on the complexity of the practice constituting the focus of a professional development, that in-service dosage (e.g., hours and number of contacts) of at least 20 hr at a minimum distributed over 15–20 weeks or sessions may be necessary to produce sustainable changes (Blank, de las Alas, & Smith, 2008; Saylor & Johnson, 2014; Yoon et al., 2007).

   The dosage of in-service professional development and follow-up necessary for producing proficient and sustained use of a practice will differ as a function of the practice constituting the focus of in-service training. In-service training on discrete practices requires fewer hours of training distributed over fewer sessions (e.g., Fukkink & Lont, 2007) than in-service training, for example, on teacher mastery and use of a curricula, which may require more than 100 hr of training implemented for 6 months or more (e.g., Blank & de las Alas, 2009).

7. *In-service professional development that includes all or most of the six sets of key features described earlier is more likely to be effective than professional development including fewer features* (Dunst et al., 2010; Joyce & Showers, 2002). Results from research reviews of the relationships between the number of key features of in-service professional development and practitioner (Dunst et al., 2010; Joyce & Showers, 2002), parent (Dunst & Hamby, in press), and child (Dunst & Hamby, in press) outcomes associated with adoption and use of different types of intervention practices show linear increases in the sizes of effects as more and more of the key features of evidence-based professional development are incorporated into in-service training opportunities. Moreover, the effects of the number of key features on study outcomes have been found to be moderated by a number of other in-service training-related variables. These include the type of practitioner learning opportunities (authentic vs. nonauthentic; Dunst et al., 2010), hours of in-service professional development (>20 vs. <20; Blank et al., 2008), and the number of in-service participants (small vs. large; Fukkink & Lont, 2007). Results indicate that the more hours of job-embedded authentic learning opportunities are provided to a small number of practitioners, the larger are the effects of in-service professional development.

CHARACTERISTICS OF IN-SERVICE EARLY CHILDHOOD INTERVENTION PROFESSIONAL DEVELOPMENT

A number of early childhood experts have reviewed the literature on different aspects of in-service professional development with

early childhood practitioners, with a focus on either the different types of in-service training used with practitioners to identify common and unique features (Snell et al., 2013; Snyder et al., 2012) or the implications of the types and forms of professional development afforded early childhood practitioners to identify research needs (Sheridan, Edwards, Marvin, & Knoche, 2009). The reviews by Snell et al. (2013) and Snyder et al. (2012) are particularly informative because many of the key features described earlier in the article were coded in the studies they reviewed. Snell et al.'s (2013) review included 69 studies and Snyder et al.'s (2012) review included 256 studies.

Snell et al. (2013) found in classroom-based (job-embedded) studies that professional development specialist modeling and demonstration of the practices constituting the focus of training occurred 82% of the time and performance feedback occurred 76% of the time but that follow-up supports by professional development specialists occurred in only 22% of both job- and non-job-embedded studies. Snyder et al. (2012), in the analysis of the studies in their review, found that job-embedded in-service training was used in 28% of the studies, job-embedded coaching or consultation was used in 16% of the studies, and shared inquiry (reflection) was used in only 2% of the studies. In contrast to Snell et al. (2013) who found that only 22% of the studies in their review included follow-up supports, Snyder et al. (2012) found that more than half of the studies in their review included follow-up supports. Taken together, however, the results from both reviews combined paint a mixed and bleak picture of the status of in-service professional development in early childhood intervention inasmuch as so few studies included many of the key features described in this article as necessary for in-service training to be effective.

The findings from both the Snell et al. (2013) and Snyder et al. (2012) reviews are encouraging and disappointing. On the one hand, it was encouraging to find that at least a number of the key features of evidence-based professional development practices described in this article were used in the studies included in their reviews. On the other hand, it was disappointing to find that only a handful of studies, and in some cases only a few studies, included certain key features (e.g., job-embedded authentic practitioner learning, practitioner reflection, coaching or mentoring during in-service training). This raises the question of whether the in-service professional development in the studies in the reviews was effective at all or, if effective, had optimal positive benefits as found in research syntheses of studies that included the majority of evidence-based professional development key features (Dunst & Hamby, in press; Dunst et al., 2010).

It would be of interest and value to reexamine the studies included in the Snell et al. (2013) and Snyder et al. (2012) reviews and to analyze the investigations in terms of the evidence-based key features described in this article and to relate the use of the key features to practitioner and child and/or family outcomes using the model in Figure 1 as a framework for conducting data analysis. This type of research synthesis would be especially informative if conducted as either a systematic review or a meta-analysis (Dunst, in press). This is the case because these types of research syntheses would permit identification of what matters most in terms of understanding which key features in which combinations under which conditions are associated with which outcomes. Results from these types of research syntheses could further inform the design and implementation of in-service professional development in early childhood intervention.

CONCLUSIONS

Professional development models described by Desimone (2009, 2011) and Guskey (1985, 2002b) were used to propose a model applicable to in-service training in early childhood intervention. The model includes key features of evidence-based in-service professional development, the changes expected

in terms of early childhood practitioners' adoption and use of evidence-based early intervention practices, the effects of the use of the practices with children or their families, and the ways in which observed benefits strengthen practitioner beliefs about the continued use of evidence-based early intervention practices. The key features of in-service professional development that were described are based on research findings from in-service training studies and research syntheses of those studies (e.g., Capps et al., 2012; Dunst et al., 2010; Fukkink & Lont, 2007; Isner et al., 2011; Zaslow, 2014). Findings from summative reviews (Snell et al., 2013; Snyder et al., 2012) of early childhood in-service professional development studies were used to highlight strengths and gaps in the types and methods of in-service professional development afforded to early childhood practitioners.

At the outset, it was noted that Guskey (2014) contended that there is a need for useful guidelines for improving the development, implementation, and effectiveness of in-service professional development. The model described in this article together with the key features of evidence-based in-service professional development should prove useful for planning and delivering in-service training to early childhood practitioners. The model provides a framework for understanding the expected flow-of-effects from in-service training to practitioner knowledge and skill acquisition to practitioner adoption and use of the practice(s) constituting the focus of in-service training and the effects on child and family outcomes. Relevant research was briefly reviewed to highlight which key features of in-service professional development under which conditions were most likely to be effective in terms of changes and improvements in practitioner, child, and family outcomes.

In-service professional development research in early childhood intervention is at a crossroads. Although quite a bit is known about the types and methods of in-service training used with early childhood practitioners, there is clearly a need for more systematic reviews and meta-analyses of in-service studies, with a focus on identifying which features of professional development are associated with observed changes and improvements in study outcomes. My colleagues and I have used a number of frameworks similar to the ones described by Desimone (2009) and Guskey (2002b) for conducting both primary studies and meta-analyses of in-service studies. These investigations, on the one hand, were designed to identify the types of pathways depicted in Figure 1 and, on the other hand, were used to unpack and disentangle which in-service professional development features under which conditions were associated with optimal practitioner and child or parent outcomes (see e.g., Dunst, Trivette, & Raab, 2014, 2015; Trivette & Dunst, 2013; Trivette, Raab, & Dunst, 2014). Most of the studies and meta-analyses included both mediated and moderated analyses that permitted determination of how the use of the key features of in-service professional development had either direct or indirect effects on practitioner, parent, and child outcomes, as well as the manner in which these relationships were influenced by other in-service training-related variables.

The results from these studies of in-service professional development show that the influences of the key features described in this article are related to practitioner outcomes in a manner similar to those found in studies conducted by other researchers (Zaslow, 2014). The results also show the manner in which the key features of in-service professional development are indirectly related to these same outcomes mediated by practitioner social validity judgments (Trivette et al., 2014). Findings also show that there are direct effects of in-service professional development on parent and child outcomes and indirect effects mediated by practitioner fidelity of the use of the early childhood intervention practices constituting the focus of in-service training (Dunst et al., 2013). As already noted, we also have found that the relationships between in-service professional development and practitioner adoption and use of early childhood intervention practices are moderated

by a number of training-related variables that are easily taken into consideration as part of the design and implementation of in-service professional development. The results, taken together, permit a better understanding of the manner in which in-service professional development can be used to promote practitioner adoption and use of early childhood intervention practices and the conditions under which in-service training is likely to be most effective.

The research and practice described in this article were completed as part of knowledge generation activities of *The Early Childhood Personnel Center* and constitutes one output that will inform the ways in which technical assistance and dissemination will be implemented (see http://www.ecpcta.org/about/evaluation.html). The professional development model and the key features of the model add to the knowledge base to ensure that professional development is evidence-based or at least is evidence-informed. The research and practice also add to the knowledge base generated in the predecessor to the current center where other aspects of professional development were the focus of investigation (e.g., Bruder & Dunst, 2015; Bruder, Dunst, & Mogro-Wilson, 2011; Bruder, Dunst, Wilson, & Stayton, 2013; Dunst & Bruder, 2014).

REFERENCES

Archibald, S., Coggshall, J. G., Croft, A., & Goe, L. (2011). *High-quality professional development for all teachers: Effectively allocating resources*. Washington, DC: National Comprehensive Center for Teacher Quality.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.

Blank, R. K., & De las Alas, N. (2009). *Effects of teacher professional development on gains in student achievement: How meta analysis provides scientific evidence useful to education leaders* (pp. 1–62). Washington, DC: Council of Chief State School Officers. Retrieved from http://eric.ed.gov/?id=ED544700

Blank, R. K., de las Alas, N., & Smith, C. (2008). *Does teacher professional development have effects on teaching and learning? Analysis of evaluation findings from programs of mathematics and science teachers in 14 states* (pp. 1–35). Washington, DC: Council of Chief State School Officers. Retrieved from http://www.ccsso.org/projects_evaluation_of_professional_development

Bransford, J. D., Brown, A. L., Cocking, R. R., Donovan, M. S., Bransford, J. D., & Pellegrino, J. W. (Eds.). (2000). *How people learn: Brain, mind, experience, and school* (Expanded ed.). Washington, DC: National Academy Press.

Browder, D. M., Jimenez, B. A., Mims, P. J., Knight, V. F., Spooner, F., Lee, A., . . . Flowers, C. (2012). The effects of a "tell-show-try-apply" professional development package on teachers of students with severe developmental disabilities. *Teacher Education and Special Education*, *35*(3), 212–227. doi:10.1177/0888406411432650

Bruder, M. B., & Dunst, C. J. (2015). Parental judgments of early childhood personnel practices: A consumer sciences perspective. *Topics in Early Childhood Special Education*, *34*, 200–210. doi:10.1177/0271121414522527

Bruder, M. B., Dunst, C. J., & Mogro-Wilson, C. (2011). Confidence and competence appraisals of early intervention and preschool special education practitioners. *International Journal of Early Childhood Special Education*, *3*(1), 13–37.

Bruder, M. B., Dunst, C. J., Wilson, C., & Stayton, V. (2013). Predictors of confidence and competence among early childhood interventionists. *Journal of Early Childhood Teacher Education*, *34*(3), 249–267. doi:10.1080/10901027.2013.816806

Cahen, R., & Superle, B. (2009). Beyond the two-hour workshop: Professional development that allows time for reflection and experimentation. *The Early Childhood Educator*, *24*(3), 13–14.

Capps, D. K., Crawford, B. A., & Constas, M. A. (2012). A review of empirical literature on inquiry professional development: Alignment with best practices and a critique of the findings. *Journal of Science Teacher Education*, *23*, 291–318. doi:10.1007/s10972-012-9275-2

Cavanaugh, B. (2013). Performance feedback and teachers' use of praise and opportunities to respond: A review of the literature. *Education and Treatment of Children*, *36*(1), 111–137. doi:10.1353/etc.2013.0001

Croft, A., Coggshall, J. G., Dolan, M., Powers, E., & Killion, J. (2010). *Job-embedded professional development: What it is, who is responsible, and how to get it done well: Issue brief*. Washington, DC: National Comprehensive Center for Teacher Quality. Retrieved from http://learningforward.org/docs/pdf/jobembeddedpdbrief.pdf?sfvrsn=0

Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational*

Researcher, *38*(3), 181–199. doi:10.3102/0013189x08331140

Desimone, L. M. (2011). A primer on effective professional development. *Phi Delta Kappan*, *92*, 68–71. doi:10.1177/003172171109200616

Donovan, M. S., Bransford, J. D., & Pellegrino, J. W. (Eds.). (1999). *How people learn: Bridging research and practice*. Washington, DC: National Academies Press.

Dunst, C. J. (in press). Role of research syntheses for identifying evidence-based early childhood intervention practices. In S. L. Odom, B. Reichow, E. Barton, & B. Boyd (Eds.), *Handbook of early childhood special education*. New York, NY: Springer.

Dunst, C. J., & Bruder, M. B. (2014). Preservice professional preparation and teachers' self-efficacy appraisals of natural environment and inclusion practices. *Teacher Education and Special Education*, *37*(2), 121–132. doi:10.1177/0888406413505873

Dunst, C. J., & Hamby, D. W. (in press). Research synthesis of studies to promote parent and practitioner use of assistive technology and adaptations with young children with disabilities. In D. Edyburn (Ed.), *Advances in special education technology (Vol. 1): Efficacy of assistive technology interventions*. Bingley, United Kingdom: Emerald Publishing.

Dunst, C. J., & Trivette, C. M. (2009a). Let's be PALS: An evidence-based approach to professional development. *Infants & Young Children*, *22*(3), 164–175. doi:10.1097/IYC.0b013e3181abe169

Dunst, C. J., & Trivette, C. M. (2009b). Using research evidence to inform and evaluate early childhood intervention practices. *Topics in Early Childhood Special Education*, *29*, 40–52. doi:10.1177/0271121408329227

Dunst, C. J., & Trivette, C. M. (2012). Meta-analysis of implementation practice research. In B. Kelly, & D. F. Perkins (Eds.), *Handbook of implementation science for psychology in education* (pp. 68–91). New York, NY: Cambridge University Press.

Dunst, C. J., Trivette, C. M., & Cutspec, P. A. (2007). *Toward an operational definition of evidence-based practices*. Asheville, NC: Winterberry Press.

Dunst, C. J., Trivette, C. M., & Hamby, D. W. (2010). Meta-analysis of the effectiveness of four adult learning methods and strategies. *International Journal of Continuing Education and Lifelong Learning*, *3*(1), 91–112.

Dunst, C. J., Trivette, C. M., & Raab, M. (2013). An implementation science framework for conceptualizing and operationalizing fidelity in early childhood intervention studies. *Journal of Early Intervention*, *35*(2), 85–101. doi:10.1177/1053815113502235

Dunst, C. J., Trivette, C. M., & Raab, M. (2014). Everyday child language learning early intervention practices. *Infants & Young Children*, *27*(3), 207–219. doi:10.1097/IYC.0000000000000015

Dunst, C. J., Trivette, C. M., & Raab, M. (2015). Utility of implementation and intervention performance checklists for conducting research in early childhood education. In O. N. Saracho (Ed.), *Handbook of research methods in early childhood education: Vol.1. Research methodologies* (pp. 247–276). Charlotte, NC: Information Age Publishing.

Ericsson, K. A., & Charness, N. (1994). Expert performance: Its structure and acquisition. *American Psychologist*, *49*, 725–747.

Fixsen, D. L., Naoom, S. F., Blase, K. A., Friedman, R. M., & Wallace, F. (2005). *Implementation research: A synthesis of the literature*. Tampa, FL: University of South Florida. Retrieved from http://www.popline.org/node/266329

Fukkink, R. G., & Lont, A. (2007). Does training matter? A meta-analysis and review of caregiver training studies. *Early Childhood Research Quarterly*, *22*, 294–311. doi:10.1016/j.ecresq.2007.04.005

Gall, M. D., & Vojtek, R. O. (1994). *Planning for effective staff development: Six research-based models* (ERIC Document Reproduction Service No. ED372464). Eugene, OR: ERIC Clearinghouse on Educational Management.

Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, *38*, 915–945. doi:10.3102/00028312038004915

Guskey, T. R. (1985). Staff development and teacher change. *Educational Leadership*, *42*(7), 57–60. doi:10.3102/0013189x015005005

Guskey, T. R. (2002a). Does it make a difference? Evaluating professional development. *Educational Leadership*, *59*(6), 45–51.

Guskey, T. R. (2002b). Professional development and teacher change. *Teacher and Teaching: Theory and Practice*, *8*(3–4), 381–391. doi:10.1080/1354060021000005 12

Guskey, T. R. (2014). Planning professional learning. *Professional Learning: Reimagined*, *71*(8), 10–16.

Hargreaves, A., & Dawe, R. (1990). Paths of professional development: Contrived collegiality, collaborative culture, and the case of peer coaching. *Teaching and Teacher Education*, *6*, 227–241. doi:10.1016/0742-051X(90)90015-W

Hatton, N., & Smith, D. (1995). Reflection in teacher education: Towards definition and implementation. *Teaching and Teacher Education*, *11*, 33–49.

Ingersoll, R., & Strong, M. (2011). The impact of induction and mentoring programs for beginning teachers: A critical review of the research. *Review of Education Research*, *81*(2), 201–233. doi:10.3102/0034654311403323

Isner, T., Tout, K., Zaslow, M., Soli, M., Quinn, K., Rothenberg, L., . . . Burkhauser, M. (2011). *Coaching in early care and education programs and quality rating and improvement systems (QRIS):*

Identifying promising features. Washington, DC: Child Trends.

Joyce, B., & Showers, B. (2002). *Designing training and peer coaching: Our needs for learning Student achievement through staff development* (3rd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

Kretlow, A. G., & Bartholomew, C. C. (2010). Using coaching to improve the fidelity of evidence-based practices: A review of studies. *Teacher Education and Special Education*, *33*, 279–299. doi:10.1177/0888406410371643

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. doi:10.1037/a0013842

Leat, D., Lofthouse, R., & Wilcock, A. (2006). Teacher coaching: Connecting research and practice. *Teaching Education*, *17*, 329–339. doi:10.1080/10476210601017477

Neuman, S. B., & Cunningham, L. (2009). The impact of professional development and coaching on early language and literacy instructional practices. *American Educational Research Journal*, *46*(2), 532–566. doi:10.3102/0002831208328088

Onchwari, G., & Keengwe, J. (2008). The impact of a mentor-coaching model on teacher professional development. *Early Childhood Education Journal*, *36*, 19–24. doi:10.1007/s10643-007-0233-0

Raney, P., & Robbins, P. (1989). Professional growth and support through peer coaching. *Educational Leadership*, *46*(8), 35–38.

Rock, H. M. (2002). Job-embedded professional development and reflective coaching. *The Instructional Leader*, *5*(8). Retrieved from http://www.ascd.org/publications/classroom_leadership/may2002/Job-Embedded_Professional_Development_and_Reflective_Coaching.aspx

Saylor, L. L., & Johnson, C. C. (2014). The role of reflection in elementary mathematics and science teachers' training and development: A meta-synthesis. *School Science and Mathematics*, *114*(1), 30–39. doi:10.1111/ssm.12049

Sheridan, S. M., Edwards, C. P., Marvin, C. A., & Knoche, L. L. (2009). Professional development in early childhood programs: Process issues and research needs. *Early Education and Development*, *20*, 377–401. doi:10.1080/10409280802582795

Snell, M. E., Forston, L. D., Stanton-Chapman, T. L., & Walker, V. L. (2013). A review of 20 years of research on professional development interventions for preschool teachers and staff. *Early Child Development and Care*, *183*(7), 1–17. doi:10.1080/03004430.2012.702112

Snyder, P., Hemmeter, M. L., Meeker, K. A., Kinder, K., Pasia, C., & McLaughlin, T. (2012). Characterizing key features of the early childhood professional development literature. *Infants & Young Children*, *25*(3), 188–212. doi:10.1097/IYC.0b013e31825a1ebf

Streufert, E. H. C. (1985). The effects of coaching, a follow-up component of inservice training, on transfer of training to teacher competency, teacher performance, and student outcomes. *Dissertation Abstracts International: Section A: Humanities and Social Sciences*, *45*(10), 3044.

Trivette, C. M., & Dunst, C. J. (2013). From research to practice in early childhood intervention: A translational framework and approach. In B. G. Cook, M. Tankersley, & T. S. Landrum (Eds.), *Advances in learning and behavioral disabilities: Vol. 26. Evidence-based practices* (pp. 173–196). Bingley, United Kingdom: Emerald Publishing Limited.

Trivette, C. M., Raab, M., & Dunst, C. J. (2014). Factors associated with Head Start staff participation in classroom-based professional development. *Journal of Education and Training Studies*, *2*(4), 32–45. doi:10.11114/jets.v2i4.449

Wei, R. C., Darling-Hammond, L., Andree, A., Richardson, N., & Orphanos, S. (2009). *Professional learning in the learning profession: A status report on teacher development in the United States and abroad: Technical report*. Dallas, TX: National Staff Development Council.

Yoon, K. S., Duncan, T., Lee, S. W.-Y., Scarloss, B., & Shapley, K. L. (2007). *Reviewing the evidence on how teacher professional development affects student achievement*. Washington, DC: U.S. Department of Education, Institute of Education Science, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southwest.

Zaslow, M. (2014). General features of effective professional development. In H. P. Ginsburg, M. Hyson, & T. A. Woosa (Eds.), *Preparing early childhood educators to teach math* (pp. 97–115). Baltimore, MD: Brookes Publishing.

Zaslow, M., Tout, K., Halle, T., Whittaker, J. V., & Lavelle, B., & Child Trends. (2010). *Toward the identification of features of effective professional development for early childhood educators: Literature review*. Washington, DC: U.S. Department of Education.